The Electrical Industry's Weekly Magazine

December 30, 1957

Electrical World

Price 50 Cents

A McGraw-Hill Publication

10 BIG DECISIONS FOR '58:

Leave A-power to government?

Can we lick summer peaks problems?

Will service quality measure up?

Who will pay for utility ads?

How fast will rates go up?

Is research the No. 1 job?

How to serve growing home loads?

Liberalized depreciation: yes or no?

Should everyone push space heating?

Can we break R/W bottlenecks?

. . . Pages 55-65

E B POWER GS &
UNIVERSITY MICROFILMS
313 N 1 ST
ANN ARBOR MICH

NITRILE RUBBER AIR CELL is innovation that enables new Atmoseal* oil-preservation system to prevent formation of hazardous gas bubbles in power transformers. Here G.E.'s L. Wetherill, Mgr.—Engineering, Power Transformer Dept., observes insertion of cell into Atmoseal tank.

New oil preservation system for General Electric power transformers combines advantages of existing methods

General Electric engineers have evolved a new method of preserving oil in power transformers—the Atmoseal constant-pressure, oil-preservation system. This system combines the major benefits of existing systems; therefore, General Electric recommends it for best all-round performance, especially on large units.

COLLAPSIBLE AIR CELL

Heart of the new system is a collapsible, Nitrile rubber air cell. This cell is vented to the atmosphere and is completely immersed in oil in a reservoir mounted adjacent to the transformer cover. As the transformer oil expands or contracts under changing loads or ambient temperatures, the air cell takes in or discharges air to prevent internal pressure variations. This virtually constant pressure plus an oil-to-air seal prevents oil supersaturation and eliminates hazardous gas bubble formation inside power transformers.

OTHER ADVANTAGES

The Atmoseal system improves upon the early, constant-pressure conservator system while retaining the important advantages of gas-sealed systems. Maintenance is virtually eliminated. Use of a gas detector relay is possible. Line interference is minimized. And the possibility of fire is reduced because the oil head is always below the level of external bushing porcelains and oil cannot feed out of a damaged bushing.

DEMONSTRATES LEADERSHIP

This advance is another demonstration of General Electric's leadership in applying research and development skills to help electric utilities meet the growing complexities of producing and delivering power. For more information on how the Atmoseal method can mean improved system operation and reliability for you, contact your General Electric Apparatus Sales Office or write for bulletin GEA-6626 to General Electric Company, Section 301-348, Schenectady 5, New York.

*Trade-mark of General Electric Company.

LIVE BETTER ELECTRICALLY

MORE POWER TO AMERICA

GENERAL ELECTRIC

Electrical World

Vol. 148, No. 27 December 30, 1957

Published for 83 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Features

CURRENT EVENTS

Shippingport Goes Into Test Operation

First U. S. commercial scale nuclear plant serves Duquesne Light Co loads .....p 52

How Will TVA Finance Future Expansion?

That's the question Congress will consider in session beginning this week. Electric companies map stand .....p 48

Steady Growth Predicted for Industry

Manufacturers foresee normal sales gains hinged to utility expansion, but worry about earnings .....p 50

DISTRIBUTION

How Iowa P&L Crossed Rail Tracks with Duct

Hydraulic jacking of corrugated steel pipe is most economical means of putting in 110 ft duct line .....p 66

Special Report

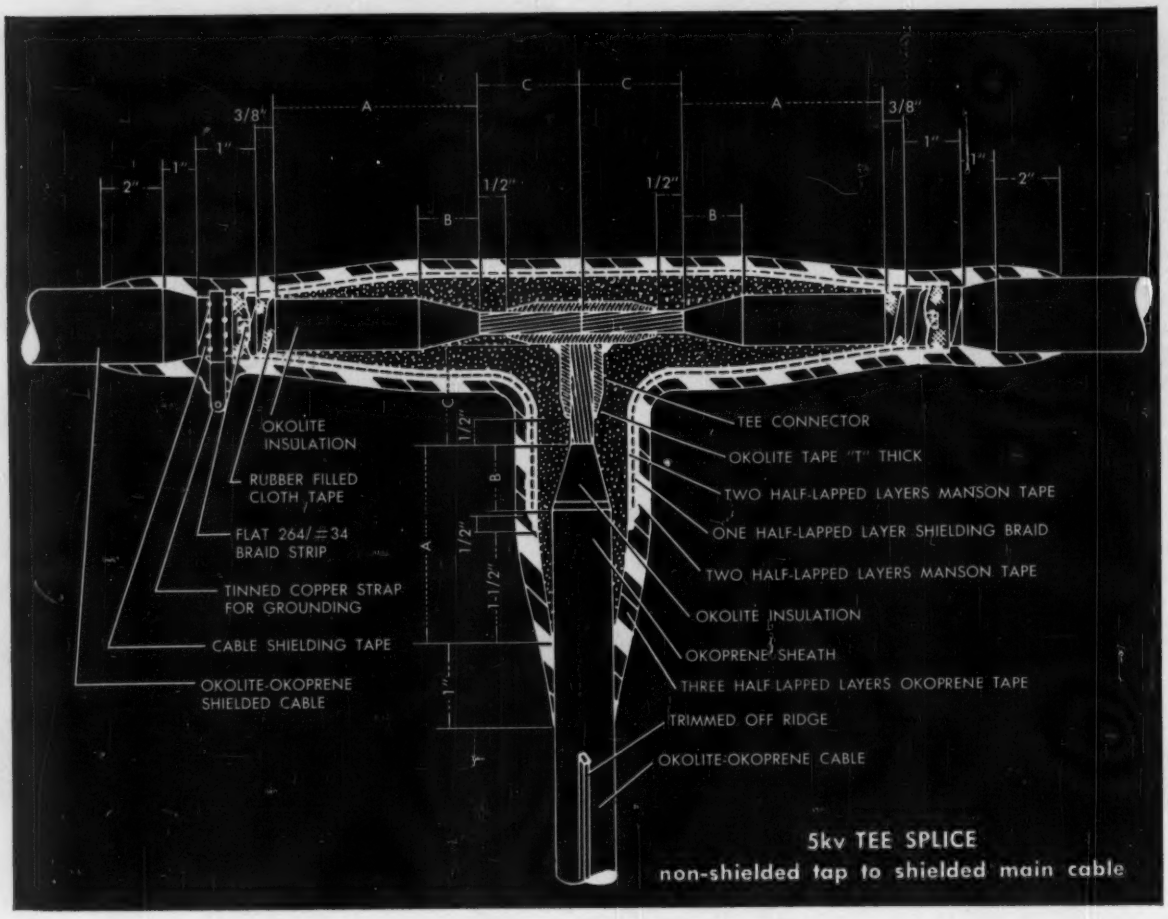
Ten Big Decisions for 1958

Staff report gives background, indicates possible methods of reaching decisions on industry's toughest problems. Among them: nuclear power development, summer peaks, improved service quality .....p 55

Departments

Atomic Progress 52
Editorials 47
• Electrical Newsletter 11
Engineering Reference Sheet.... 72
Engineering Trends 14
From the Publisher..... 5
Heating & Cooling..... 78
Statistics 110
How To 69
• Management Newsletter 109
Manufacturers and Markets.....115
Meetings Calendar 118
New Equipment 84
News About People.....122
News Beat 54
Readers Forum 124
Selling 74

INDEX TO ADVERTISERS.....130



The "simple" tee splice . . .

The simple tee splice . . . is really not so simple. A glance at the splice diagram above certainly shows this. Don't gamble with the dependability of your cable system by neglecting its splicing or terminating. Use the correct splicing methods and the best materials available to insure the safety of the system.

Complete splicing and terminating diagrams, like the one above, along with step-by-step instructions covering rubber-insulated cables up to 5000 volts are available in Okonite Bulletin EW-1085. These splicing instructions are a result of Okonite insulation research—the same research that has developed the industry's best-known splicing materials . . . Manson friction tape, Okonite rubber tape, Okolite high voltage rubber tape, and Okoprene weather-resistant neoprene tape. For full details, contact your distributor or The Okonite Company, Passaic, N. J.

Available through authorized distributors only

OKONITE **splicing tapes**

4326

Electrical World Staff

Fischer Black Publisher and Editor
Daniel T Braymer Assistant to the Editor

Engineering

Leonard M Olmsted Managing Technical Editor
John J Kearney Assistant Managing Technical Editor
Howard S Knowlton New England Editor
Edward Allen Midwestern Editor
Francis J Kovalcik Middle Eastern Editor
David Rea Southeastern Editor
James G Plunkett Northeastern Editor
Charles F Hochgesang Western Editor
Archer E Knowlton Consulting Editor

News

Herbert R Frankel Managing News Editor
Rue M Shoop Associate Editor
Allen Long News Editor **Michael G Duerr, Theodore Fuller** and **Denise McCarthy** Assistants
Thomas R Jordan Commercial Editor
Kenneth N McLean Industrial Editor
George B Bryant, Jr Manager, Washington Bureau
V Craig Richter..Washington Correspondent

Special Services

Arthur J Stegeman Manager Market Research
Dexter M Keezer Director, Economics Department
E Russell Eggers Economist

Production

Jesse A Mock Manager of Production
George Swift Assistant Manager of Production
Frank C Stockman Art Director
H Tomlinson Howland, Jr Production Editor
Elinor Gulla Assistant Production Editor

Advertising

Warren W Shew Sales Manager
District Managers: N V Palmer, E S Chapin and D J Roberts, New York; E S Chapin, Boston, F P Coyle, Philadelphia; M S Kearney, Cleveland; M I O'Connell, Detroit; W H Meneilley and J T Schaefer, Chicago; J T Schaefer, St. Louis; Russell Antles, Los Angeles; R C Alcorn and T H Carmody, San Francisco; Robert H Powell, Atlanta; Gordon Jones, Dallas.
Otto Drechsel Business Manager
Donald K Ellis Promotion Manager

●

E Bryson Sessions Circulation Manager

. . . from the publisher

Organizations Move Forward

Perhaps the most dramatic change in the electrical industry in 1957 took place in industry associations. Each one in its own area took new leadership, expanded activities, and set plans which should produce substantial benefits in 1958.

Edison Electric Institute plowed into problems of public relations, research, engineering manpower shortage and a variety of other areas. EEI also faced up to its responsibilities in the promotion of all-electric living. The Association of Edison Illuminating Companies expanded with six new members and gave notice that it intends to be a stronger factor in promoting sound research and leadership in solving industry problems. Similarly area associations such as the Southeastern Electric Exchange and Pacific Coast Electric Association took steps to provide greater service to their memberships.

In the professional field the American Institute of Electrical Engineers put new life in its local programs by stimulating the formation of technical groups.

It is significant that in a period of economic recession that the forces for change, improved technology, and growth are so strong. It is certain that these forces will provide a dynamic change in a dynamic industry.

Fischer Black

ELECTRICAL WORLD

Published weekly by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948), Founder. **Executive, Editorial, Circulation, and Advertising Offices:** McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Printed at 99-129 North Broadway, Albany 1, N. Y. See panel at right for directions regarding subscriptions or change of address.

Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice President; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator.

Subscriptions are solicited from executive, supervisory, and engineering personnel in electric utilities, manufacturing companies, and related fields; and from consulting engineers and electrical engineers in industry. **Position and company connection must be indicated on subscription orders.** Send to address shown in box at right.

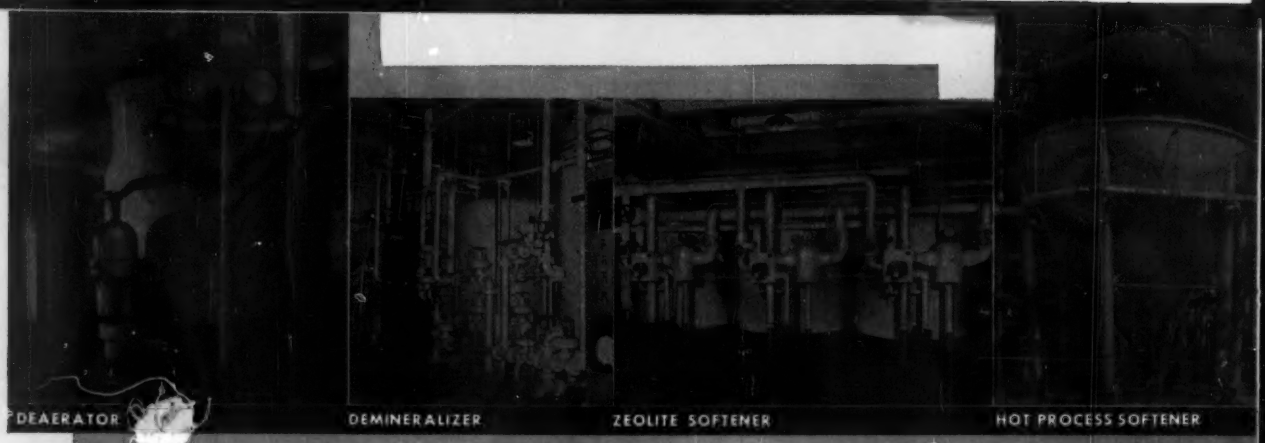
United States and Canada subscription rate for individuals in the field of the publication $6.00 per year, single copies 50 cents. Other Western Hemisphere and the Philippines $20.00 payable in advance and other countries $30.00 payable in advance.

Second-class mail privileges authorized at Albany, N. Y. Printed in U.S.A.

Title registered in U. S. Patent Office. ©Copyright 1957 McGraw-Hill Publishing Company, Inc. Permission required to reproduce any of contents.

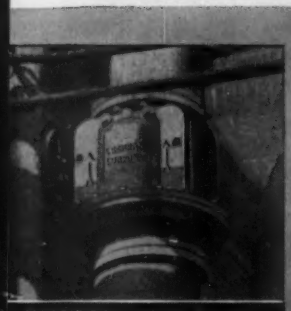
SUBSCRIPTIONS AND ADDRESS CHANGES: Send subscription correspondence and change of address to Subscription Manager, ELECTRICAL WORLD, 330 West 42nd Street, New York 36, N. Y. Subscribers should notify Subscription Manager promptly of any change of address, giving old as well as new address, and including postal zone number, if any. If possible, enclose an address label from a recent issue of the magazine. Please allow one month for change to become effective.

Postmaster . . . Please send form 3579 to Electrical World, 330 W. 42nd St., New York 36, N. Y.

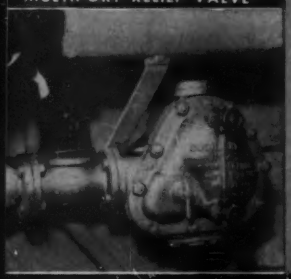


DEAERATOR | DEMINERALIZER | ZEOLITE SOFTENER | HOT PROCESS SOFTENER

Engineering and Equipment by **Cochrane** *assure complete water conditioning service*



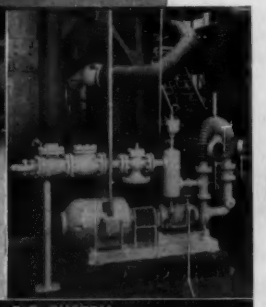
MULTIPORT RELIEF VALVE



MULTIPORT DRAINER

STEAM PURIFIER

OIL SEPARATOR



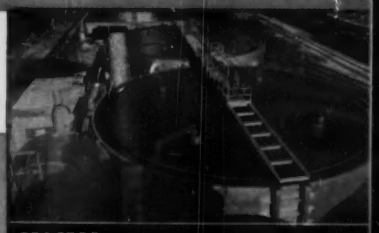
C-B SYSTEM

For over half a century Cochrane Corporation has pioneered major developments in the field of water conditioning. Today, Cochrane leads in installation of deaeration, hot process and hot lime zeolite equipment.

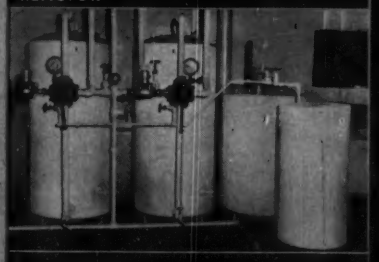
Development of the Cochrane Hydromatic Valve sets a new standard in automatic control for Ion Exchange Processes.

Cochrane's background as heat engineers has also been responsible for the development of steam specialties recognized and used throughout industry today. The C-B Jet Pump improves heat transfer, reduces drying costs with resultant product improvement and usually increases production output.

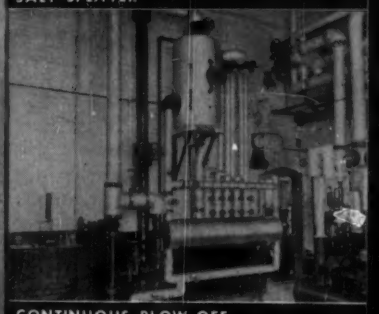
This complete service, available at Cochrane, provides a single responsibility for continuous satisfactory operation of every installation. It is an assurance that guarantees will be met. Why not consult Cochrane?



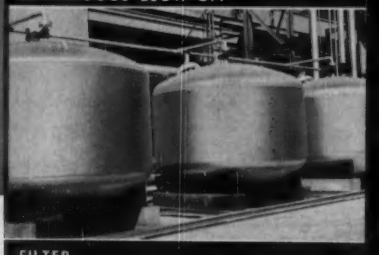
REACTOR



SALT SPLITTER



CONTINUOUS BLOW-OFF



FILTER

COCHRANE CORPORATION WATER AND HEAT ENGINEERS SINCE 1863 PHILADELPHIA

Cochrane
CORPORATION

Representatives in Thirty Principal Cities in U.S., San Juan, Puerto Rico; Honolulu, Hawaii; also: Paris, France; La Spezia, Italy; Mexico City, Mexico; Havana, Cuba; Caracas, Venezuela; San Diego, Chile; Manila, Philippine Islands.
Pottstown Metal Products Division—Custom built carbon steel and alloy products

3146 N. 17TH STREET, PHILADELPHIA 32, PA.
NEW YORK • PHILADELPHIA • CHICAGO
Cochrane Water Conditioning Ltd., Toronto 4, Montreal 1, Winnipeg 1, Canada.

Demineralizers • Hot Process Softeners • Hot Zeolite Softeners • Dealkalizers • Reactors • Deaerators • Continuous Blowoff Systems • Condensate Return Systems • Specialties

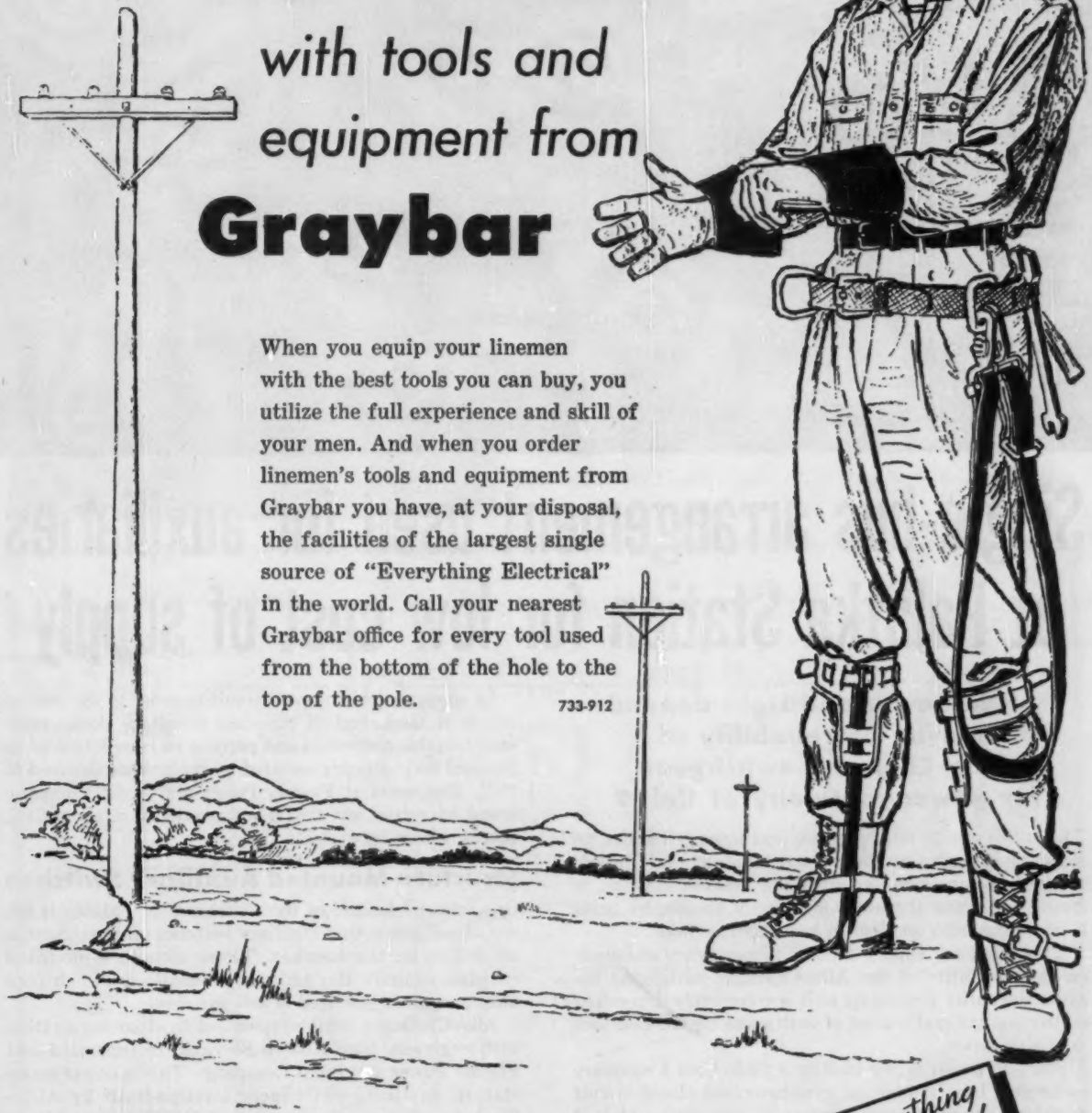
picture of a man on his way UP

with tools and equipment from

Graybar

When you equip your linemen with the best tools you can buy, you utilize the full experience and skill of your men. And when you order linemen's tools and equipment from Graybar you have, at your disposal, the facilities of the largest single source of "Everything Electrical" in the world. Call your nearest Graybar office for every tool used from the bottom of the hole to the top of the pole.

733-912



Call Graybar first for...

GRAYBAR ELECTRIC COMPANY, INC.
420 Lexington Avenue, New York 17, N. Y.

IN OVER 130 PRINCIPAL CITIES

Single-bus arrangement used for auxiliaries at Palatka Station for low cost of supply

Florida Power and Light depends heavily on reliability of Allis-Chalmers switchgear for power continuity of Unit 2

The entire design was based on maximum reliability for a minimum cost of equipment and construction. Outdoor type of construction provided the greatest savings, of course. Keeping the auxiliary supply simple, by using a single bus, also resulted in important savings .

This auxiliary supply scheme places heavy emphasis on the reliability of the Allis-Chalmers switchgear because the entire generating unit is completely dependent on the one bus and one set of switchgear for the essential auxiliary drives.

Start-up power is provided by a tie to Unit 1 auxiliary switchgear bus. A manual synchronized closed-circuit transfer is used during start-up. If generating Unit 2 goes off the line, auxiliaries may be kept in operation by power from Unit 1.

In emergencies, an open-circuit transfer to the reserve source is used, and in this case a voltage decay relay monitors this throwover and permits its completion when residual bus voltage generated by motors has decayed to 25%. Engineers at Florida Power and Light Company found by actual test that a voltage decay of about 75% occurs within 50 cycles.

Structure Mounted Auxiliary Switches

One unusual feature of the switchgear at Palatka is the use of positive acting auxiliary switches on the structure as well as on the breaker. These structure-mounted switches simplify the addition of auxiliary switch contacts and avoid the need of cell switches.

Allis-Chalmers engineers worked in close cooperation with engineers from Ebasco Services, Incorporated and Florida Power and Light Company. This is one of many station auxiliary switchgear lineups built by Allis-Chalmers. For an answer to your switchgear problems, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

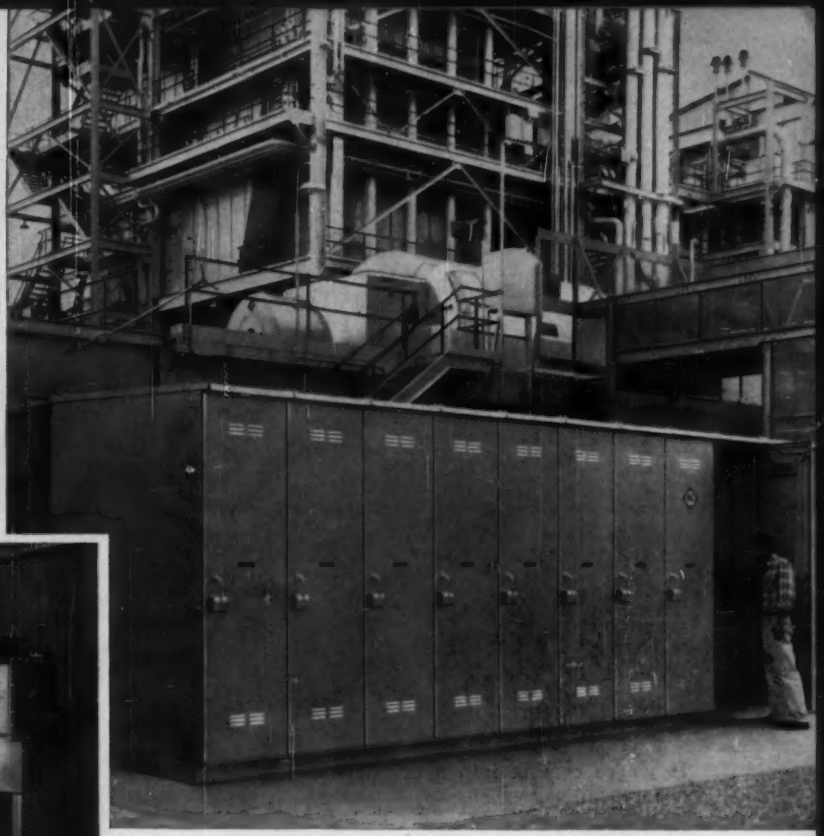
For Progress in Switchgear

ALLIS-

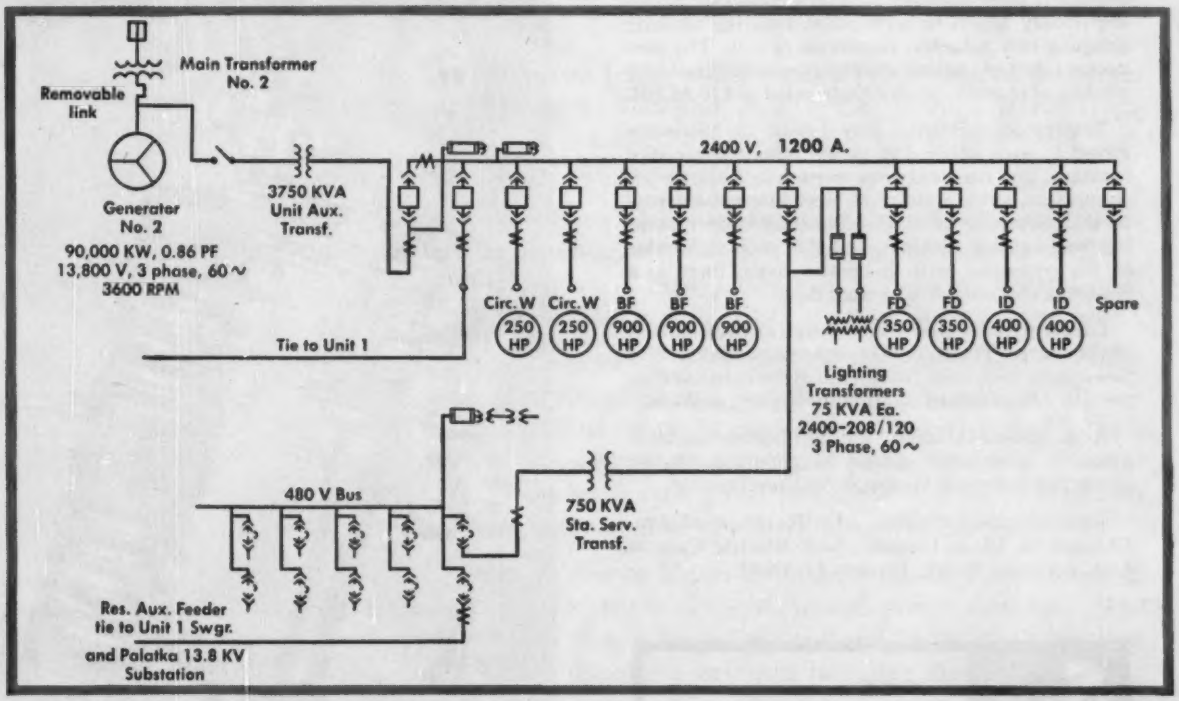
Palatka Station has an installed capacity of 128,000 kw. Outgoing power is transmitted at 115 kv and 69 kv.

Unit substation type construction was used on both the 2400-volt and 480-volt switchgear to conserve space and provide good appearance.

Allis-Chalmers outdoor-type 480-volt low voltage switchgear is used on circuits for lighting, condensate pumps, lubricating oil pumps, motor control centers and fuel oil boosters.

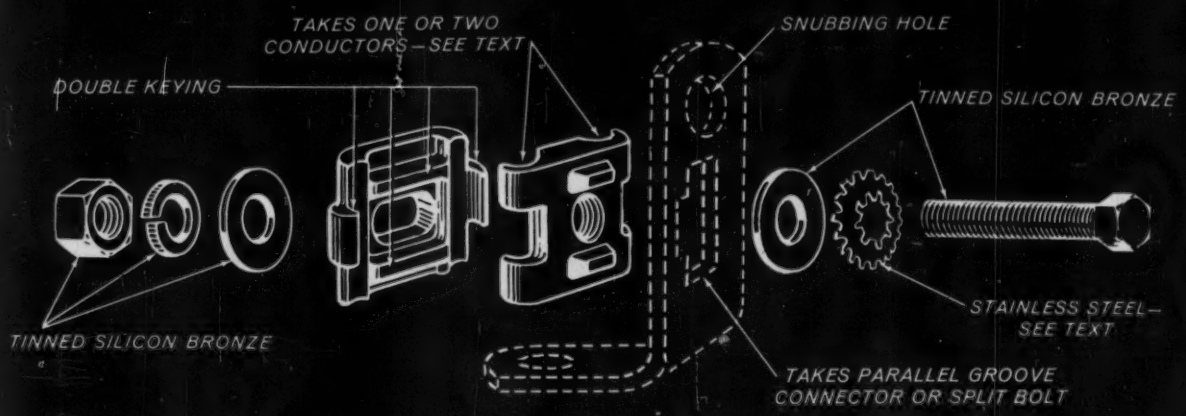


Ebasco Services, Incorporated, Engineers and Constructors.


Main Transformer No. 2
Removable link
Generator No. 2
90,000 KW, 0.86 PF
13,800 V, 3 phase, 60 ~
3600 RPM
3750 KVA Unit Aux. Transf.
2400 V, 1200 A.
Circ.W 250 HP
Circ.W 250 HP
BF 900 HP
BF 900 HP
BF 900 HP
FD 350 HP
FD 350 HP
ID 400 HP
ID 400 HP
Spare
Tie to Unit 1
Lighting Transformers 75 KVA Ea. 2400-208/120 3 Phase, 60 ~
480 V Bus
750 KVA Sta. Serv. Transf.
Res. Aux. Feeder tie to Unit 1 Swgr. and Palatka 13.8 KV Substation

CHALMERS

A-5504



now! parallel groove connectors on S&C's Open Cutout

If you're coming into a cutout with aluminum, chances are you will want a parallel groove connector. With S&C's Type XS Open Cutout you can have this feature at no charge.

Expressly designed for use with aluminum conductors, this new parallel groove connector has an unusually large gripping area. The connector halves are doubly keyed to each other, insuring uniform gripping of conductor, regardless of size. The connector takes one or two aluminum conductors—copper too, of course—up to 2/0 stranded or 1/0 ACSR.

Making connections is easy. Connector halves are keyed to each other and to the cutout to prevent rotation. You need only one wrench to make up the connectors, since a stainless steel internal-external tooth lockwasher holds the connector body mounting bolt against turning. And, for each tightening of the connector with lineman's tools, there is a generous size nut—5/8" across flats.

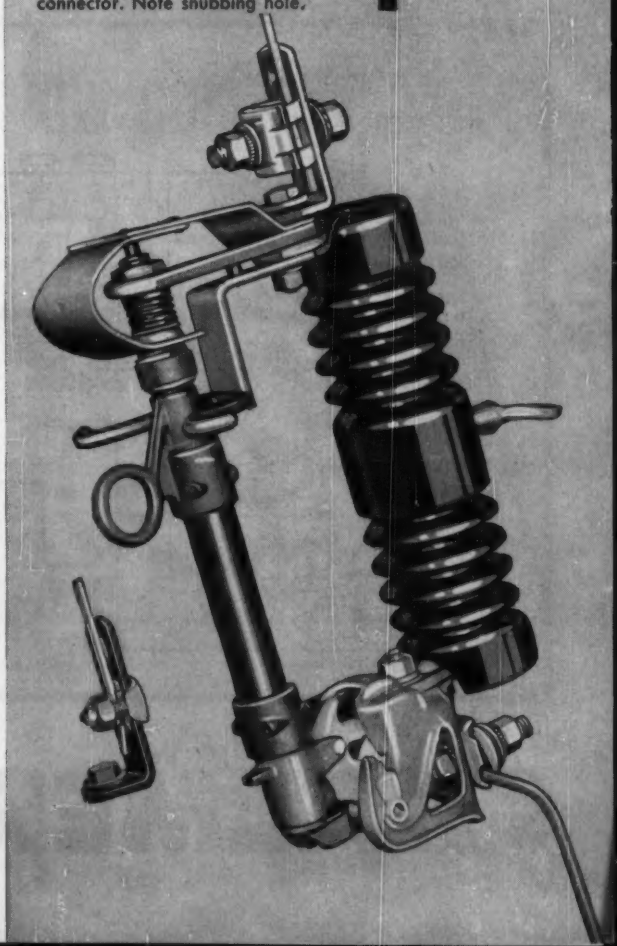
Larger parallel groove connectors are available at slight charge. These connectors accommodate one or two conductors, from No. 2 solid aluminum (or copper) to 4/0 standard aluminum, copper, or ACSR.

As an optional standard the split-bolt connector is available at no extra charge. Maximum conductor size is No. 1 stranded—copper or aluminum.

S&C Electric Company, 4421 Ravenswood Ave., Chicago 40, Ill. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ont.

S&C ELECTRIC COMPANY

Type XS Open Cutout—7.5 kv, 100 amperes continuous, 12,000 amperes interrupting—shown with parallel groove connectors. Insert (below) shows optional split-bolt connector. Note snubbing hole.



NEWS-SCOPE

FUTURE NEWS ▶ **Investor-owned utility expenditures will climb about 8% in 1958.** This is indicated in preliminary returns from Electrical World's annual statistical survey. Reports received to date show generation expenditures up 29%, transmission plant up 9%, and distribution plant holding at the same rate as this past year.

LATE NEWS ▶ **Rep Earl Chudoff (D—Pa.) is resigning from Congress** to become a judge in Philadelphia. As chairman of the subcommittee on public works and resources, he became well known for his probes of the electric companies and the administration's power policies.

The Arco (Idaho) reactor, idle since its fuel rods melted two years ago, has been restarted by AEC. With a new core to give it greater stability, it's now undergoing preliminary tests.

Rural electric systems financed by REA estimate construction needs during fiscal 1959 at $282 million, according to latest REA survey. Previous survey, in 1956, set 1959 needs at $194 million.

Citizens of Covington (Tenn.) vote 547-163 to switch to TVA power system from their city-owned power plant. Only problem now: Whether to sell city plant to Southwest Tenn Electric Membership Corp, a TVA distributor, and buy from that firm (STEMC is offering $650,000 and power in three months) or to hook directly to TVA (rates would be lower, but hook-up would cost city $150,000 and take a year).

Four New York-New Jersey utilities seek FPC permission to merge. They are Orange & Rockland Electric Co; Orange & Rockland Electric of N. J. (an affiliate); Rockland Light & Power Co, and Rockland Electric Co. (a subsidiary).

TVA directors approve a 5% wage boost for about 9,000 construction and maintenance union employees. Total cost of increase to TVA: $2.25 million a year . . . New Jersey P&L and Jersey Central P&L sign three union contracts with IBEW granting a 6.2% wage hike.

Illinois Power Co is asking the state commerce commission to okay an increase in its electric rates. Said Pres Allen Van Wyck: "If this rate had been in effect for the 12-month period ended June 30, 1957, it would have provided $4,240,000 more than received." . . . Wisconsin Electric Power needs a 6.4% rate increase to provide $5.9 million a year in new revenue, said VP Alfred Gruhl before the PSC.

Part of the U. S. Navy's 10,000-kw mobile power plant travels to Mexico City to ease severe drought-induced power shortage. The unit, owned by the Navy's Bureau of Yards and Docks, saved Mexican L&P from having to enforce stringent rationing measures.

Management promotions . . . New VP's at Dayton Power & Light are Samuel J. Schiml, controller, and Edwin D. Smith, manager of public and industrial relations.

ELECTRICAL WEEK

A TWO-MINUTE

ATOMIC PROGRESS ▶ **Shippingport atomic power plant has developed 68 Mw** of its ultimate 60-Mw capacity in recent tests. This is the first large-scale civilian atom plant in the U.S. It is to be operated for the AEC by Duquesne Light Co. Latest figures show the plant cost $72.5 million, of which the reactor cost $55 million **(p 52).**

WASHINGTON ▶ **How is TVA to finance its future power expansion?** Something has to be done soon: TVA hasn't begun construction of any new generating facilities since 1953. Meanwhile load is growing 15% a year. TVA began using its power revenues to add capacity at existing plants to hold the load through 1959. But in 1960 load is to grow 750,000 kw a year for five years, according to estimates. Power revenues can't support this. Here's a thumbnail sketch of TVA, relief measures to be considered by Congress, and restrictions TVA's critics want for its future **(p 48).**

EVENTS ▶ **Stable growth is ahead for equipment manufacturers in 1958.** Informal survey of chief executive predictions shows they think the new year will start slow, but end fast. GE's Cordiner sees 1958 being as good as 1957, maybe better. He said 1957 may be GE's best year yet. Westinghouse's Price expects peak sales in '58, and "optimism" for utilities; he sees sales of consumer products increasing modestly. Other manufacturers and EEI's Pres McAfee speak up on **p 50.**

THE OUTLOOK ▶ **Utility management will face crucial challenges in 1958** calling for decisions on important problems. Political, economic, technical, and operating pressures, individually or in combination, are molding these problems. EW editors discuss here the ten top decisions that must be made, along with recommendations for each problem **(p 55-65):**

In nuclear power, which is under intense political pressure, the decision is in the policy area. It may well determine the degree to which nuclear power will be federalized.

New summer peaks, produced by weather-sensitive loads, are calling for increased investment in overhead distribution, underground cable, and generating equipment.

Higher service quality is becoming a must, as a result of automation and electrical living. The drive for service continuity requires evaluating needs of customer classes, measuring the performance of individual systems, then devising solutions for system deficiencies.

Electric company advertising is another target of political pressures. The industry will have to repulse an attack aimed at crippling its ability to function as a business.

Electric rates are becoming insufficient as a result of economic, tech-

nical, and operating pressures. Utilities will have to decide: "How fast must rates be raised to keep financially healthy?"

The need for research, of which management is well aware, calls for each company to decide how much it can afford and where this research should be done.

Conventional distribution methods will be on trial as utilities face the need for changes to serve higher residential loads in prospect.

Liberalized tax depreciation gives management the choice of rejecting the benefits or taking them at the risk of incurring unfavorable regulatory decisions.

Space-heating can be the biggest ever in '58. But an effective program calls for planning and action in areas of policy, rates, promotion, and heat engineering.

Rights-of-way are becoming increasingly difficult to procure as a result of inflation and customer resistance. A major attempt to break the R/W bottleneck will be the founding of an independent group of utility R/W men.

DISTRIBUTION ▶ **To install a 110-ft duct line beneath main-line tracks** of three railroads, Iowa Power & Light chose a method which did not interfere with train operation. It jacked bitumastic-covered corrugated steel pipe under the tracks, then laid a duct line through the pipe **(p 66).**

SELLING ▶ **A centralized customer service center** recently was inaugurated by Duquesne Light Co to speed the handling of telephone queries. A punch-card business machine is the center's "backbone" **(p 74).**

RATES ▶ **Missouri's PSC is to review its rate-making formula,** taking inflationary trends into consideration when setting valuations. This is the effect of a recent state Supreme Court decision relating to a case brought by Missouri Water Co. The court cited the "decreasing purchasing power of the American dollar" **(p 111).**

PEOPLE ▶ **Gulf States Utilities Co** has named John P. French director of purchasing. He succeeds the late Jack R. Orrick . . . Pacific Coast Engineering Co has made C. D. Ramsden president and general manager **(p 122).**

NEW EQUIPMENT ▶ **Meter by-pass enables meter changing** without service interruption . . . Secondary racks are light, sturdy, and come in extended or non-extended back styles . . . Low-resistance ohmmeter checks breaker contacts without necessitating breaker disassembly **(p 84).**

MANUFACTURERS ▶ **New type of high-speed, frequency-shift tone system** for microwave and wire links has been shipped to three utilities **(p 115).**

ENGINEERING TRENDS

Modern battery railcars are being used successfully in Germany. Two-car trains are equipped with batteries whose storage capacities enable an average daily run of 150 to 200 miles. The lead-acid batteries used account for 20% of the total weight of the two-car train. Train can attain a speed of 60 mph.

Splitting rocks of any size by running a high-voltage current through water has been claimed by Russia. No fragments are scattered following the explosion, nor is there any noise. Further details are not available.

Circuit designers will seek to build reliability into distribution as continuity requirements of rural service approach a level which cannot be attained by more extensive use of automatic sectionalizing devices. A basically unreliable feeder cannot be made reliable with reclosers and fuses.

Maximum concentration of stack pollution varies inversely as the square of the height of the stack. A complex mathematical theory was presented to support this conclusion at a recent meeting of Great Britain's National Smoke Abatement Society.

Discharging ash from a power plant into the outflow condenser cooling water is being studied by British engineers. It is proposed to convey the ash in separate pipes to the mouth of a warm water culvert below sea level where the water velocity is 4 to 5 ft per sec.

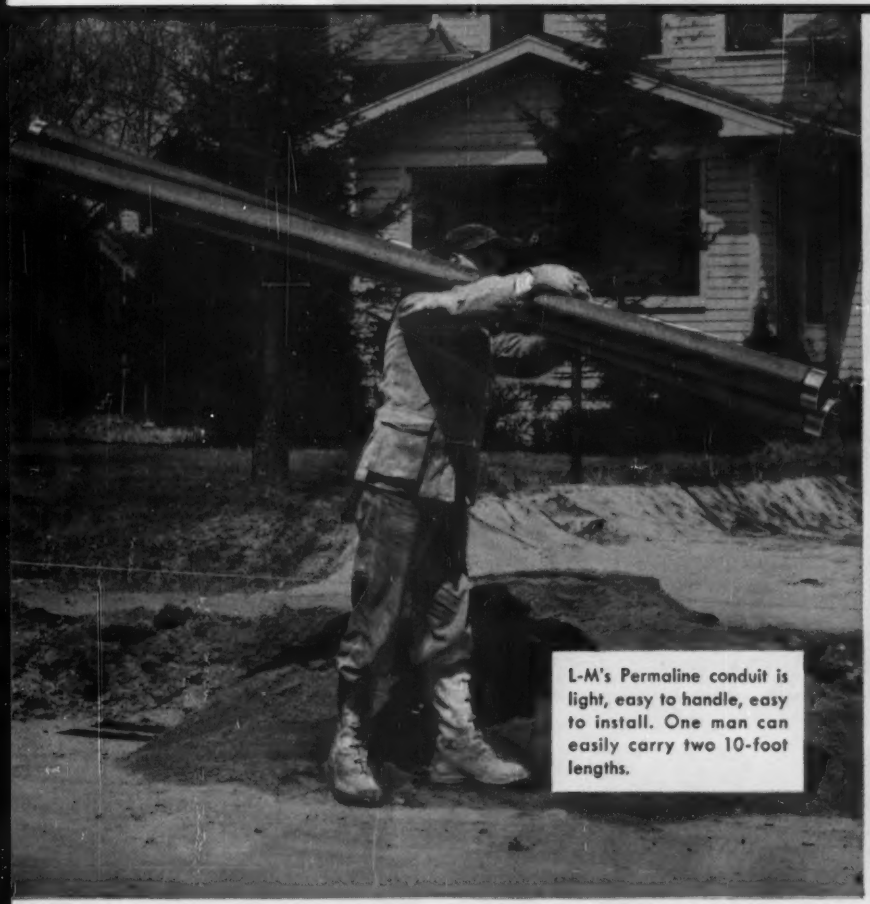
Enriching nuclear fuel improves design in most reactors systems studied by U. S. scientists and engineers. Enriched fuel allows greater flexibility in the composition and makeup of fuel elements and leads to substantially longer fuel life than can be obtained with natural uranium.

Energy from a single solar cell has driven a small electric motor in England for about two years. During this period the little motor has only stopped operating on three days. This occurred when the area was covered by a thick smog.

FROM EDITORS IN THE FIELD

Why do line trucks carry a spare tire? A review by an Eastern utility of flat tires suffered by line trucks in the field showed that removal of the spare was justified. Now the line trucks carry more pay load; flat tires, if any, are fixed with a new wheel and tire brought out from the shop.

Plant thermal efficiency of the Experimental Boiling Water Reactor plant is about 23% at 5,000 kw gross electrical output. Auxiliary load is approximately 500 kw. And turbine heat rate is 12.54 lb of steam per kwhr at 2.5 in. Hg condenser pressure.



L-M's Permaline conduit is light, easy to handle, easy to install. One man can easily carry two 10-foot lengths.

L-M's extra-long 10-foot lengths of Permaline conduit speed installation. Simply tapping the tapered coupling onto the tapered end of the conduit makes a strong, watertight joint—no caulking needed.

Saves Time and Labor...

Contractor Eliminates 13,750 Joints

With Long 10-foot Lengths of L-M Permaline Conduit!

Now, with L-M's exclusive 10-foot lengths of Permaline fibre conduit, you can eliminate 20% to 50% of the joints to be made on a job, and thus cut costly construction time and labor.

On one job requiring 550,000 feet of conduit, the contractor eliminated 13,750 joints by using L-M's long 10-foot lengths as compared with 8-foot lengths.

It will pay you to use L-M's time- and labor-saving 10-foot lengths of Permaline conduit for your next duct job. Only L-M Permaline is available in these 10-foot lengths.

Easy to Install

L-M lightweight Permaline fibre conduit is also easy to install. Joints are quickly made by simply tapping the tapered coupling onto the tapered end of the conduit. Joints are watertight and safe from seepage. Smooth bore reduces cable sheath abrasion. Completely engineered system for installation includes full line of bends, bell ends, couplings, and base and intermediate spacers.

L-M Permaline fibre conduit comes in 5, 8 and 10-foot lengths. Available diameters include 2, 3, 3½, 4, 4½, 5 and 6-inch sizes.

Get Complete Information

Ask the L-M Field Engineer for a copy of the 12-point plan folder which shows how easy it is to use the Permaline system; or Fibre Conduit Bulletin UG1A, which gives complete specifications. Or write Line Material Industries, Milwaukee 1, Wisconsin.

310

LINE MATERIAL Industries

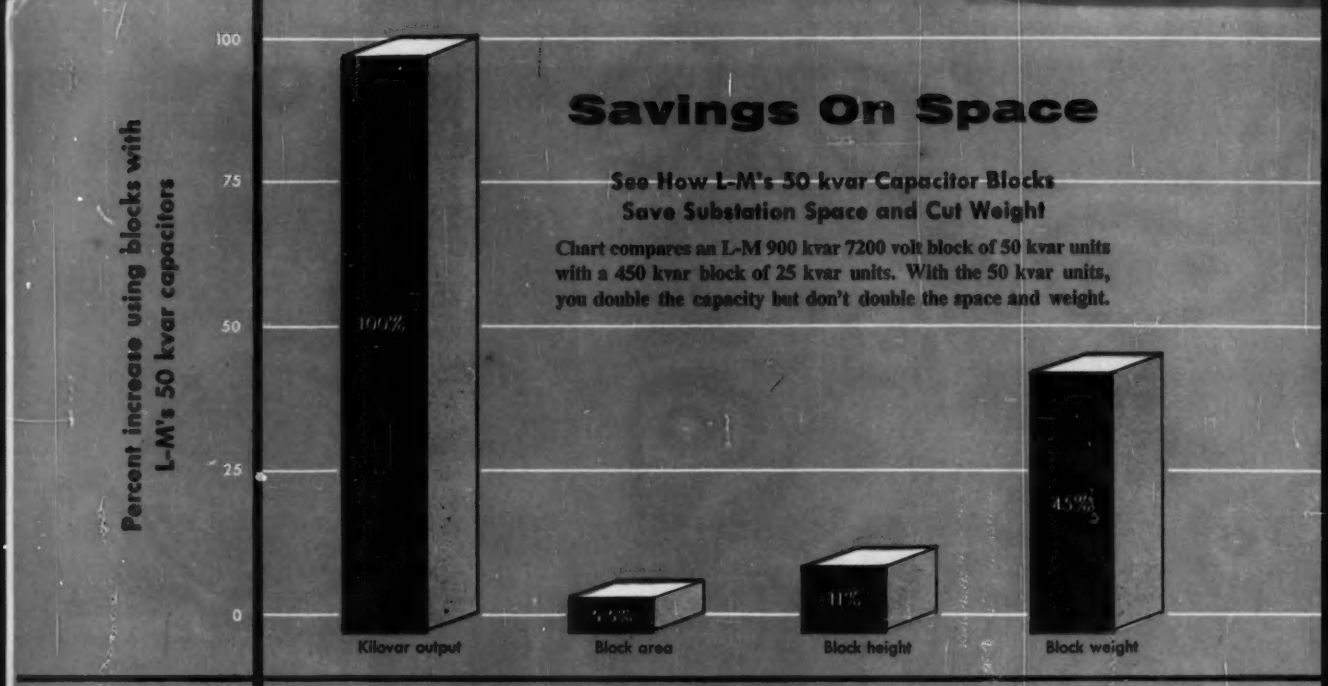
McGRAW-EDISON COMPANY

McGRAW EDISON

Permaline Fibre Conduit

BPI

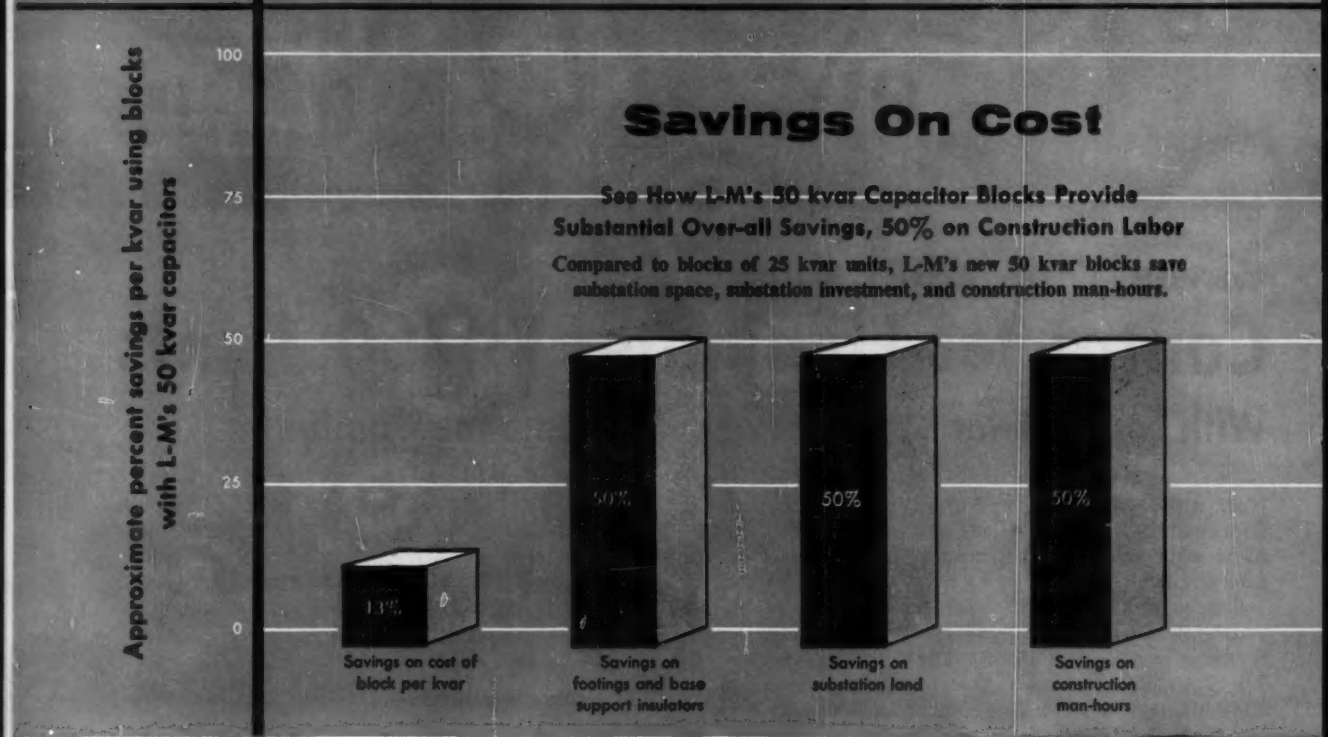
This seal is your guarantee of recognized quality in Bituminous Fibre Conduit.



Savings On Space

See How L-M's 50 kvar Capacitor Blocks Save Substation Space and Cut Weight

Chart compares an L-M 900 kvar 7200 volt block of 50 kvar units with a 450 kvar block of 25 kvar units. With the 50 kvar units, you double the capacity but don't double the space and weight.



Savings On Cost

See How L-M's 50 kvar Capacitor Blocks Provide Substantial Over-all Savings, 50% on Construction Labor

Compared to blocks of 25 kvar units, L-M's new 50 kvar blocks save substation space, substation investment, and construction man-hours.

ANOTHER L-M CAPACITOR FIRST . . .

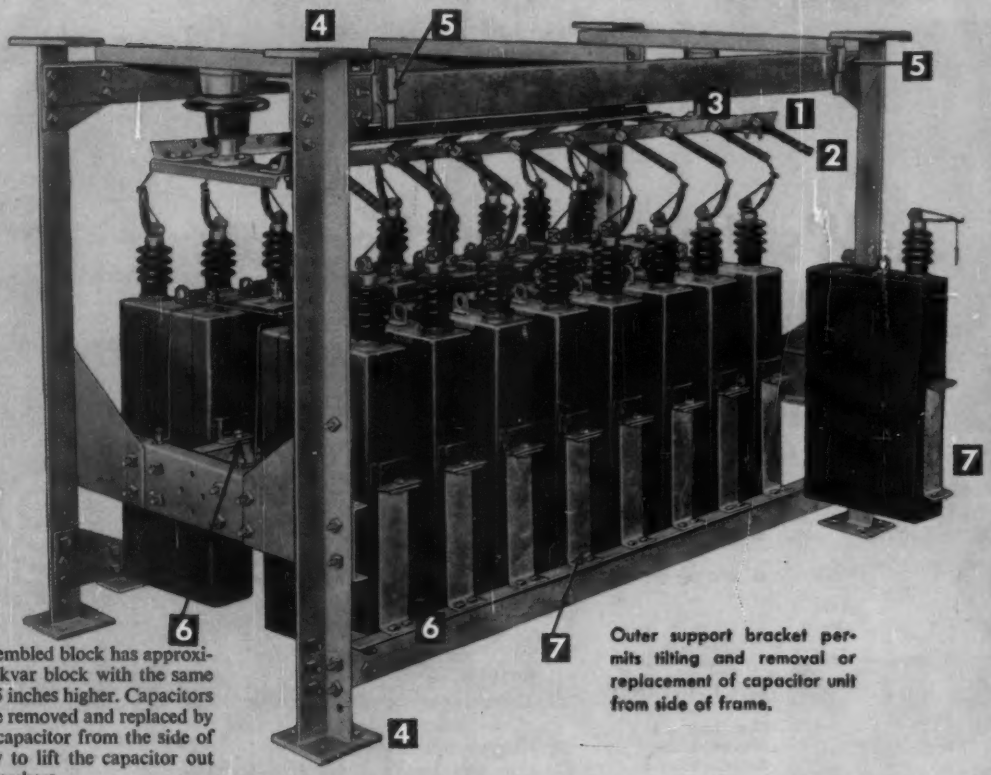
Units Now Shipped in New "Tear Strip" Carton

All individual L-M capacitor units are now packed in cartons that can be quickly and easily removed.

The new carton has a reinforced cloth tape cemented around the inside about two inches above the bottom. The tape is attached to pull tabs on the outside of the carton. When the tab is pulled, the tape makes a cut completely around the carton. The carton can then be quickly and easily lifted off the capacitor.

Simply pull the tape—to remove the carton.

296-R


1 Aluminum-alloy bus
2 Bus-mounted fuses
3 Bus connections wire brushed and treated with oxidation inhibitor.
4 Jig-assembled for perfect alignment of mounting pad bolt holes.
5 Lifting lugs.
6 Tapped holes in frame for capacitor mounting bolts. Nuts not needed.
7 Outer support bracket permits tilting and removal or replacement of capacitor unit from side of frame.

L-M's new 50 kvar factory-assembled block has approximately the same area as a 25 kvar block with the same number of units and it is only 5 inches higher. Capacitors in L-M's 50 kvar blocks can be removed and replaced by simply tilting and sliding the capacitor from the side of the block. It is not necessary to lift the capacitor out from between the mounting members.

Another L-M First...

L-M's 50 Kvar Capacitor Blocks Provide Kilovars At Still Lower Costs

By **BLAINE SCHULTZ**
Chief Engineer
Capacitors and Regulators
Line Material Industries

Only half as many units are required in substation capacitor banks when you use L-M's new blocks of 50 kvar capacitors. In addition, these blocks reduce the number of fuses, footings, and base support insulators, as well as the construction man-hours required for any given-size bank. L-M 50 kvar preassembled capacitor blocks also cost less and require about 50% of the substation area per kvar in comparison with blocks containing 25 kvar capacitors.

Capacitor Unit

The internal construction of L-M's 50 kvar capacitor is identical with that of the 25 kvar unit except for the length of pack. There is no increase in voltage stress to get the higher kvar rating. The new design is the result of continued improvement in dielectric materials and manufacturing techniques.

The tank has the same width, same thickness as the 25 kvar capacitor. Only 10 inches of additional height give you twice the capacity. It also has aluminum-metallized coating under alkyd resin paint; paragroove clamp-type terminals; strong solder-sealed bushings; and low-temperature Elemex liquid dielectric.

Factory-Assembled Blocks

L-M offers a complete line of NEMA Standard 50 kvar factory-assembled blocks from 2400 through 7960 volts—400 to 1200 kvar ratings in 100 kvar increments.

Outstanding features of L-M factory-assembled blocks include:

- Aluminum-alloy bus which is not subject to cold flow.
- Bus-mounted capacitor fuses with stainless-steel flipper to eject the leader if fuse link ever blows. Leader cannot hit live parts.
- Connections to the bus are wire brushed, and treated with oxidation inhibitor.
- Height of block is increased only 5 inches, because it is so designed that capacitors can be installed and removed from the *side*. It is not necessary to provide clearance to lift the capacitor out from between the mounting members.
- Heavy galvanized frame is jig-assembled for perfect alignment of mounting-pad bolt holes.

Prompt Delivery Now

You can save on the cost of equipment, man-hours, and space in the substation when you specify L-M NEMA Standard 50 kvar capacitor equipments. Prompt delivery . . . on all sizes and voltage ratings. Ask your L-M Field Engineer for complete information on L-M's new 50 kvar factory-assembled capacitor equipments. Or write Line Material Industries, Milwaukee 1, Wisconsin.

McGRAW EDISON

196-AR2

LINE MATERIAL Industries *Elemex Capacitors*
McGRAW-EDISON COMPANY

L-M's New 32-Step Regulator Combines All Desirable Features in One Unit... Plus:

- **reliable, accurate regulation**
- **smooth tap changes, long life**
- **ease of installation and maintenance**

by **N. K. DELANEY**
Product Manager, Capacitors and Regulators, Line Material Industries

Line Material has designed into one compact, efficient regulator all the desirable features found in all other standard makes—plus a few L-M "exclusives."

Sensitive Voltage Control

L-M uses an induction disc-type contact-making voltmeter for reliable, accurate voltage control. The unit is very sensitive, and easily adjustable to a band width of from plus and minus ¾ to plus and minus 6 volts. An integrated time-delay device is used to control the tap-change operation. The time delay can be adjusted independently on both "raise" and "lower" through a range of from 10 to 120 seconds.

Maximum Contact Life

The tap-changing mechanism on L-M's new 32-step regulator is designed to assure smooth operation and maximum contact life. The speed of the tap changer is hydraulically controlled to assure minimum arcing. This, plus a reactor which bridges across adjacent taps during operation, permits smooth tap changes, without current interruption or voltage dip.

Easy to Inspect

The complete internal assembly of the regulator is suspended from the cover to simplify untanking for periodic inspection and maintenance. This desirable feature permits you to inspect all mechanical and electrical parts quickly and easily without draining oil or dismantling the unit.

Less Bending Moment On Pole

The L-M exclusive obround tank design makes the unit smaller, lighter, with shorter moment arm distance from the pole. The unit is easier to handle and install, and the design substantially decreases the total bending moment on the pole.

Greater Current Capacity With ADD-AMP Feature

It is possible to increase the load-carrying capacity of L-M's new regulator up to 160% of its normal rating by reducing the regulation to ±5%. The range of regulation can be reduced externally without de-energizing the regulator.

Get More Information

Ask your L-M Field Engineer for more information on L-M's new 32-step regulator—the regulator with all the best operating and convenience features available on any and all other pole-type regulators. Or write Line Material Industries, Milwaukee 1, Wisconsin.

301

Bushings are corona-free, and are designed for minimum radio interference.

Moving contacts and arcing tips of stationary contacts are made of arc-resistant copper-tungsten alloy to assure long contact life.

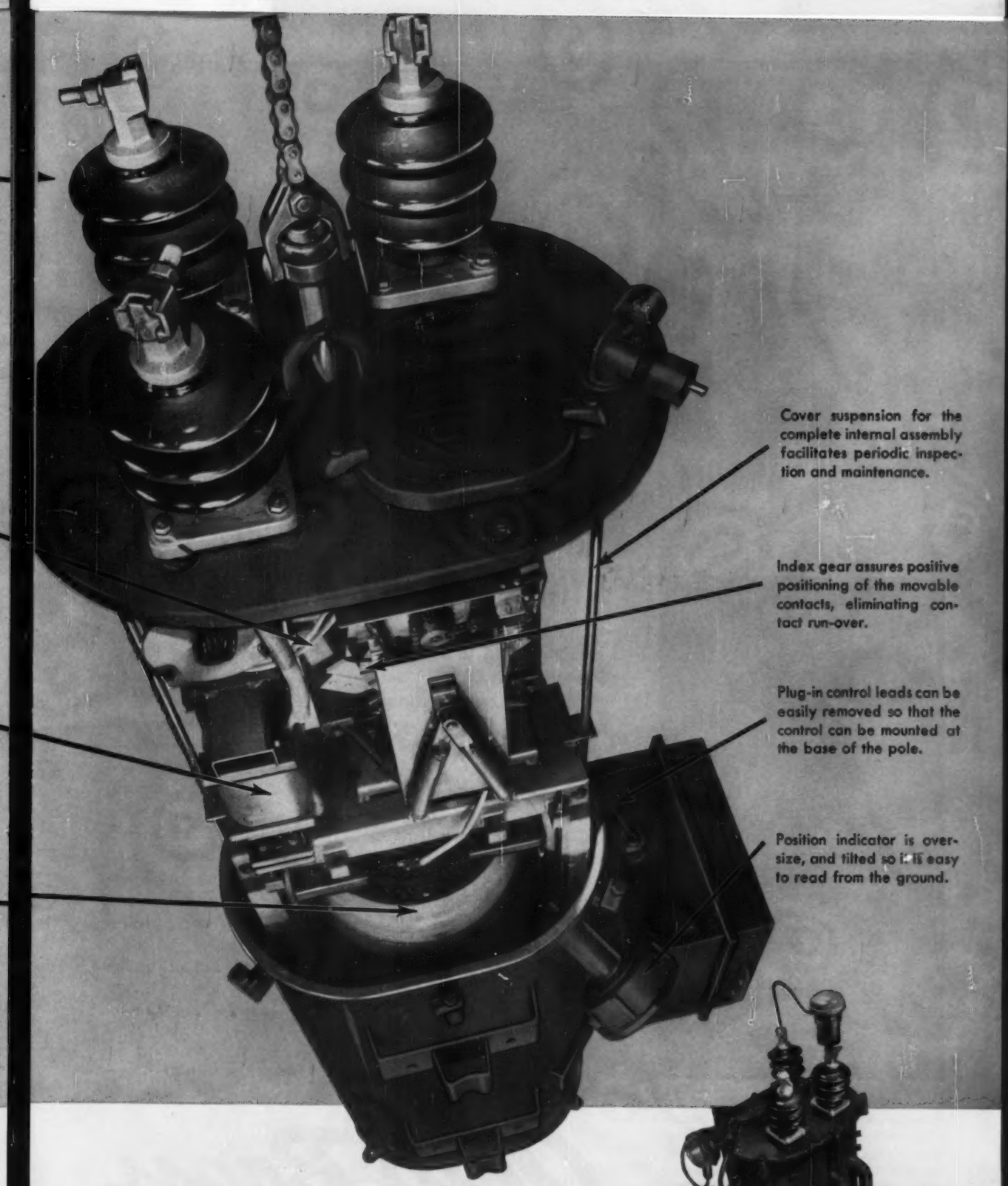
Bridging reactor provides smooth tap changes . . . no current interruption or voltage dip.

L-M's exclusive Round-Wound core-coil assembly provides a balance of low copper loss, low exciting current, and low core loss.

Available Ratings

2500 volts . . .
100, 150 and 200 amperes
5000 volts . . .
50, 100, 150 and 200 amperes
7620 volts . . .
25, 50, 75, 100, 150 amperes

LINE MATERIAL Industries
McGRAW-EDISON COMPANY



Cover suspension for the complete internal assembly facilitates periodic inspection and maintenance.

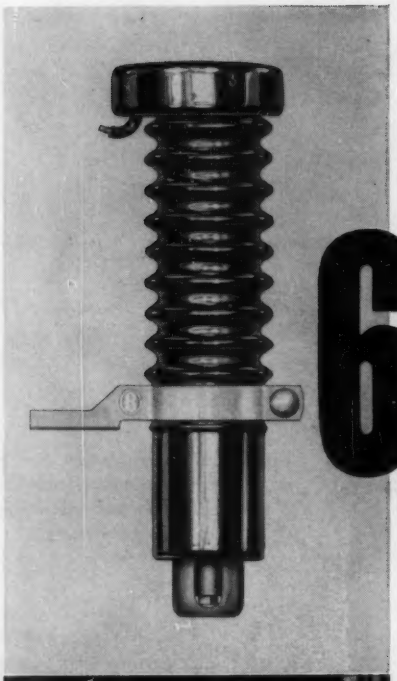
Index gear assures positive positioning of the movable contacts, eliminating contact run-over.

Plug-in control leads can be easily removed so that the control can be mounted at the base of the pole.

Position indicator is oversize, and tilted so it is easy to read from the ground.

Regulators

McGRAW EDISON



670 YEARS

OF AVERAGE SERVICE HARMLESS TO NEW THOREX DYNAGAP DISTRIBUTION ARRESTER

This happened to a *distribution* arrester — the new Thorex Dynagap!

While sustaining full rated 60-cycle voltage, a typical lightning impulse discharge was superimposed. This sequence was followed consecutively for 1,000 shots — the statistical equivalent of 670 years of average service. Parts were then examined and found to be still in perfect condition; fully capable of going on indefinitely.

Probably you will never have such demands for such a large number of operations on your own distribution system, although occasional arresters may perform frequently. Nevertheless, this test is indicative of the unheard-of surplus protection the new Thorex Dynagap provides in all categories of arrester functions.

. . . and this is done with an arrester as little as half the size of equivalent types, and selling at comparable prices.

Can you afford waiting any longer to put this superior arrester protection on your distribution system?

OHIO BRASS COMPANY • MANSFIELD, OHIO

Ohio Brass

4822-H

Active elements of the Thorex Dynagap distribution arrester under test in the O-B High Voltage Laboratory. With full rated voltage sustained, lightning impulse discharges were superimposed for 1,000 consecutive shots. Statistically this is the equivalent of 670 years of service. All parts of the arrester, after the test, were in perfect condition and fully serviceable in every respect.

PREFORMED ARMOR RODS
increase uninterrupted service life of conductor

The wind blows, the conductor vibrates and the life of your line is at stake. If the vibration problem is such that severe frequency and amplitude conditions are sufficiently prolonged, the conductor could begin to break regardless of the protective armor used. And, if the conductor begins to break, PLP Preformed Armor Rods have a big advantage over other armor: The rods undertake the function of an electrical and mechanical repair splice.

All armor rods greatly reduce vibration stresses, but if vibration is severe enough to cause strand breaks, other types will not prevent parting of the strands. With PLP (short pitch) Preformed Armor Rods, it's a different story; the conductor is held tightly and uniformly throughout the entire length of the rods—not at one point. You have a long, firm grip that never relaxes, that maintains conductivity in spite of the break. Thus, your line continues to function unimpaired.

There is one other Preformed advantage to keep in mind. Some types of armor require the use of bolted end-clamps that can shake loose and cause chafing. Preformed Armor Rods require no end-clamps.

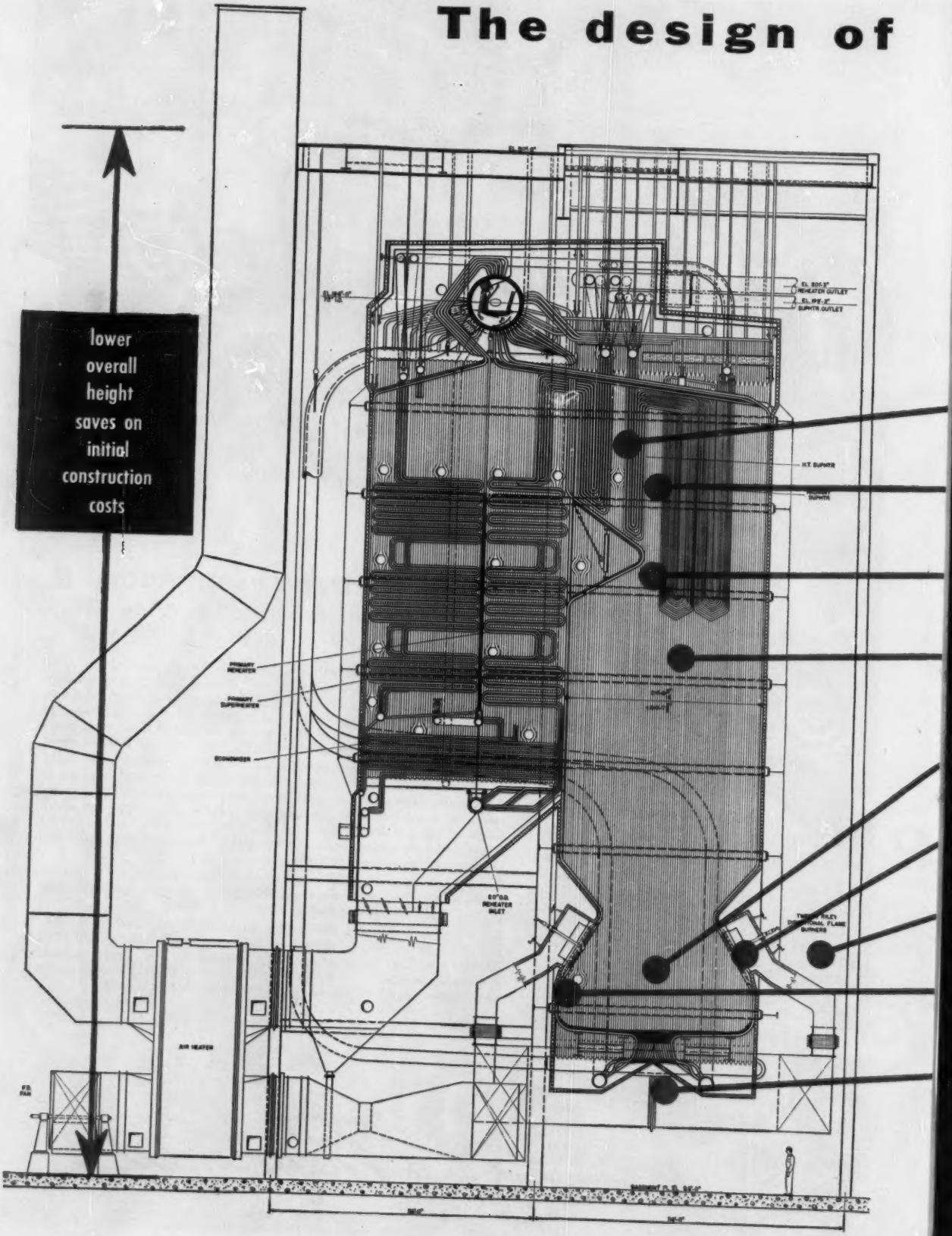
For a long uninterrupted service life, Preformed Armor Rods are the best suit of armor your conductor can wear. PREFORMED LINE PRODUCTS COMPANY, 5349 St. Clair Avenue, Cleveland 3, Ohio. Cable Address: Preformed-Cleveland . . . in 10 years the leading manufacturer of armor rods, dead-ends, Guy-Grip dead-ends and other line accessories.

PLP

You can look up to **Preformed**

Made in accordance with or for use under U. S. Patent Nos. 2,609,653; 2,275,019 and 2,587,521. Other patents pending.

The design of



the future that's HERE!

the RILEY TURBO FURNACE

- No major alteration in pressure parts when changing from gas and oil to solid fuels
- Same furnace exit gas temperatures with all fuels
- Slag blowers may be eliminated
- No stratification of furnace gases Furnace walls stay clean
- High turbulence and long residence time of fuels promotes negligible carbon losses
- Directional flame burners for multiple fuels
- Burner location on one level permits turbine level operation
- With Flyash reinjection, unburned losses are negligible
- Slag tapping with reinjection eliminates flyash disposal problem

The unit illustrated is being built at Sterlington Station for Louisiana Power & Light Company. Steam capacity—1,600,000 lbs./hr.—2125 psig, 1005 F. Reheat. Fuel will be gas and oil initially. Pulverized coal, fluid coke or lignite can be fired at anytime in the future.

The Riley TURBO FURNACE Boiler Design has enjoyed a remarkable acceptance since it was first introduced late in 1954. Because of its versatility it has been incorporated into boiler capacities from 150,000 up, reheat or non-reheat, pressurized and non-pressurized. The TURBO FURNACE has been purchased to satisfy numerous operating requirements: to be able to fire multiple fuels, for quick low cost conversion from gas or oil to coal or other solid fuels, to burn fluid coke as a major fuel, to eliminate slagging and slag blowers, to refire flyash and thus eliminate flyash disposal. Twenty TURBO FURNACE units have been sold for industrial and central station installations totalling over ten million pounds of steam per hour. It will pay you to investigate to get the full story on the extra dividends possible in a TURBO FURNACE unit.

A survey of your plant by a consulting engineer could show ways of making surprising savings in your power costs. .

RILEY
Stoker Corporation
WORCESTER, MASSACHUSETTS

Sales Offices: Worcester, New York, Philadelphia, Buffalo, Pittsburgh, Cleveland, Detroit, Chicago, Cincinnati, Charlotte, New Orleans, Atlanta, St. Louis, Kansas City, St. Paul, Houston, Salt Lake City, Los Angeles, San Francisco, Portland, Seattle.

New residential subdivision gets

Three 600v Durasheath Cables were pulled in ducts throughout development.

underground distribution system

Electric service is provided by 141,000 feet of Anaconda Durasheath Cable

For one of the South's largest new developments, an entire underground distribution system was installed recently.

The cables: 106,000 feet of Anaconda's 4/0, 1/C 600v Durasheath* neoprene-jacketed cable with Anaconda Type ANW network insulation, and 35,000 feet of #2, 1/C 15kv grounded neutral Durasheath with Type AB butyl insulation.

A good choice! Anaconda's special network and high-voltage butyl insulations give you top moisture and heat resistance, excellent overload protection. Type AB butyl insulation, too, has *inherent* resistance to ozone.

Available in all sizes, single and multiple conductor, copper and aluminum, from 600 to 15,000 volts. Want more information? See the Man from Anaconda or your Anaconda distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

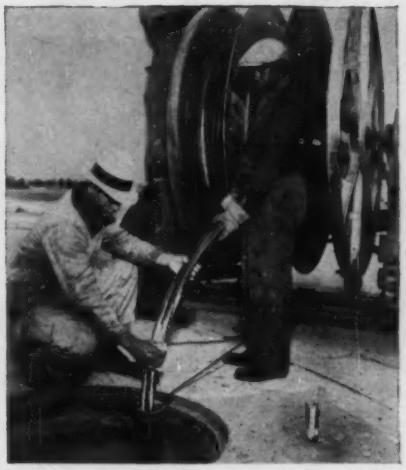
*Reg. U.S. Pat. Off. 57260

LIVE BETTER ELECTRICALLY

SEE THE MAN FROM **ANACONDA®**

FOR **DURASHEATH CABLE**

Each reel on special electric-powered rig held 400 feet of Durasheath.



600v Durasheath shown trained through last manhole to side of transformer vault.

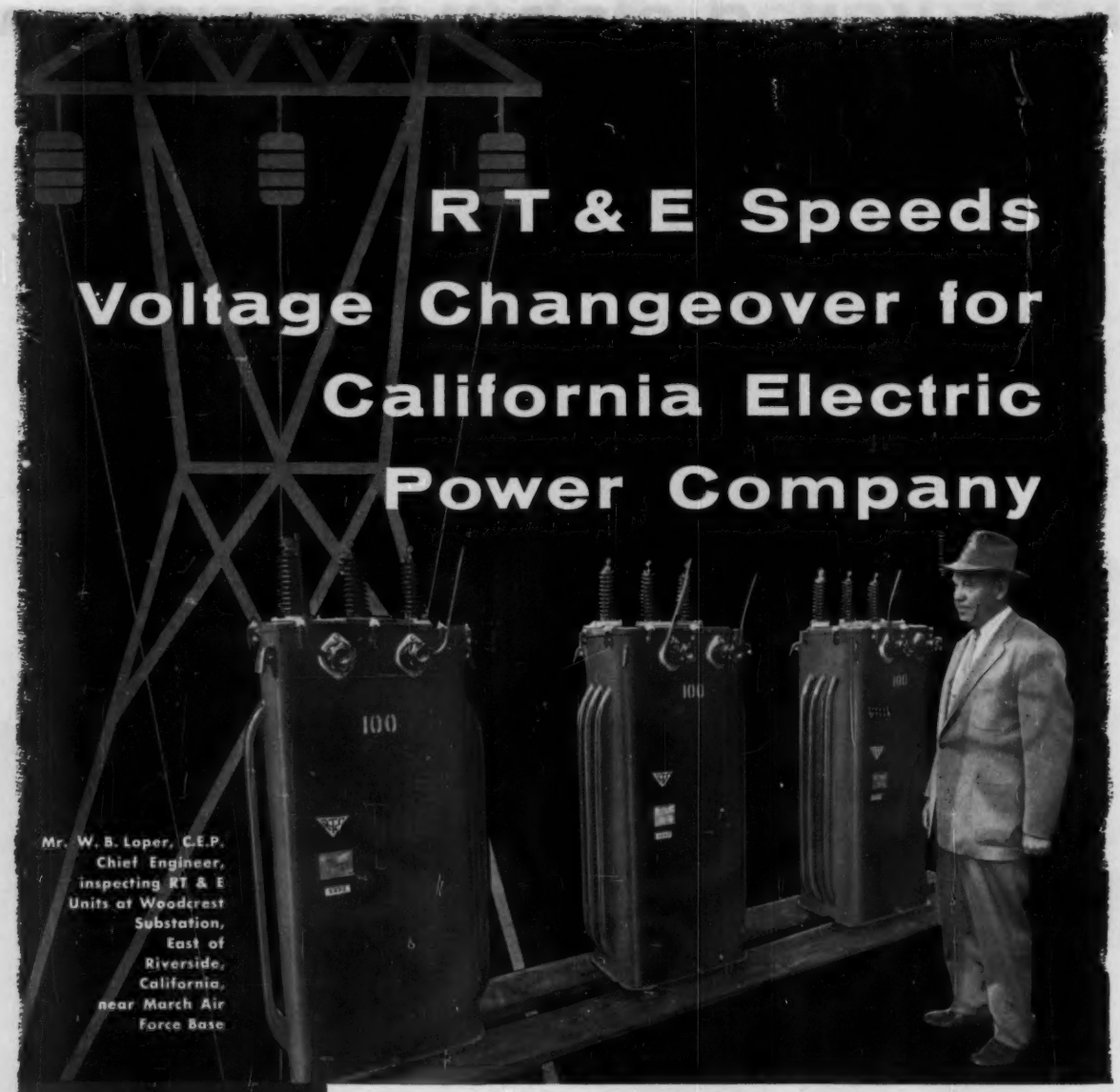
15kv Durasheath was likewise pulled into transformer house through duct.

In underground vault of substation, cable was trained to the wall.

In transformer house, 600v Durasheath was terminated at transformer secondaries.

In same location, 15kv Durasheath is shown being terminated at transformer bushings.

R T & E Speeds Voltage Changeover for California Electric Power Company



Mr. W. B. Loper, C.E.P. Chief Engineer, inspecting RT & E Units at Woodcrest Substation, East of Riverside, California, near March Air Force Base

California Electric Power Company faced the problem of making a rapid cutover . . . in areas served from distribution circuits of 2400, 4160, and 4800 volts delta and wye . . . to 12,000 volts.

Mr. W. B. Loper, Chief Engineer of California Electric Power, found after careful study that these cutovers could be made faster and more economically if special 100 KVA transformers were available.

The problem was presented to the R T & E Engineering Department, where swift and careful attention to the problem resulted in a specially designed transformer capable of transforming all three voltages to the 12 KV level.

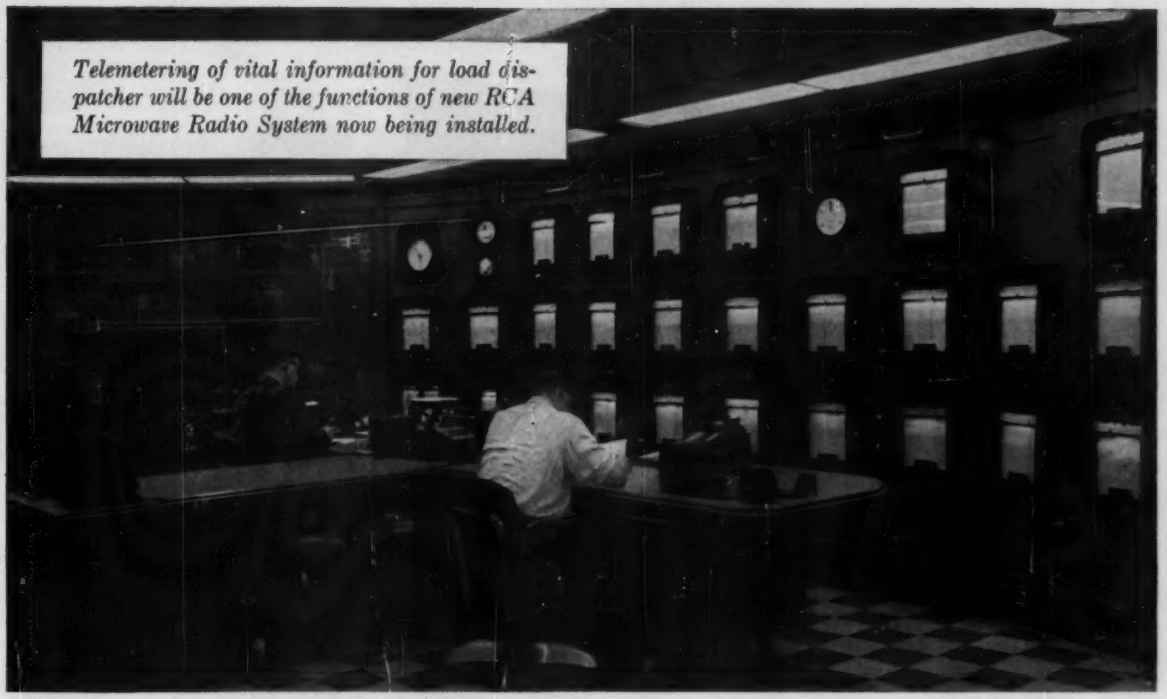
These special units were manufactured and delivered in record time to meet an emergency condition, saving the utility time and money. Electrical characteristics proved to be excellent, and cutovers were made on schedule.

This type of special service is another reason why R T & E Transformers are being specified by more and more utilities the nation over.

IMPULSE TESTED

R T & E CORPORATION
Waukesha, Wisconsin

Equipment to help provide power for America



Telemetering of vital information for load dispatcher will be one of the functions of new RCA Microwave Radio System now being installed.

Dependable Performance, Versatility and Economy Assured by RCA Microwave System

at Indiana & Michigan Electric Co.

Mobile units can be contacted by RCA 2-Way Radio from load dispatchers' control point.

RCA Microwave is always your best investment whether for a simple two-station installation or a completely integrated system, in utilities, pipelines, off-shore drilling, turnpikes and other applications. RCA MICROWAVE... performance proved in more than a million miles of operating systems throughout the world. Mail coupon for more information.

Because of a saturated carrier current system at Indiana & Michigan Electric, new communications facilities had to be provided. Installation of a microwave communications system would supply dependable, high quality channeling, and RCA CW-20 Microwave was selected. Along with voice communication circuits, it will also provide telemetering and control of mobile units from the load dispatchers' control room.

Three points of superiority led to this choice of equipment. (1) The RCA CW-20 system lends itself to use of flexible transmission cable and less rigid tower structures. At some points along the first leg of the system, existing towers could be used, thus saving costs. (2) Because RCA uses single sideband frequency division multiplexing, it occupies the narrowest bandwidth for a given number of channels. Should present rules on spectrum use be tightened, the use of narrow bandwidth now could eliminate the need for altering multiplex equipment in the future. The high reliability of RCA Microwave which insures a minimum outage time during fades, results in an expected *total system reliability of 99.95%*. (3) 72 voice channels are available now, and additional "two-way" telegraphic channels may be superimposed on the 4 to 10 KC portion of the baseband spectrum. This feature will provide room for a substantial increase in channeling, when desired, with economy of cost.

RCA Trade(s) ®

RADIO CORPORATION of AMERICA

COMMUNICATIONS PRODUCTS
CAMDEN, N. J.

Radio Corporation of America
Communications Products
Dept. A-45, Building 15-1, Camden, N.J.
In Canada: RCA VICTOR COMPANY Limited, Montreal

☐ Please send me latest literature on use of RCA Microwave in_____

NAME_____ TITLE_____

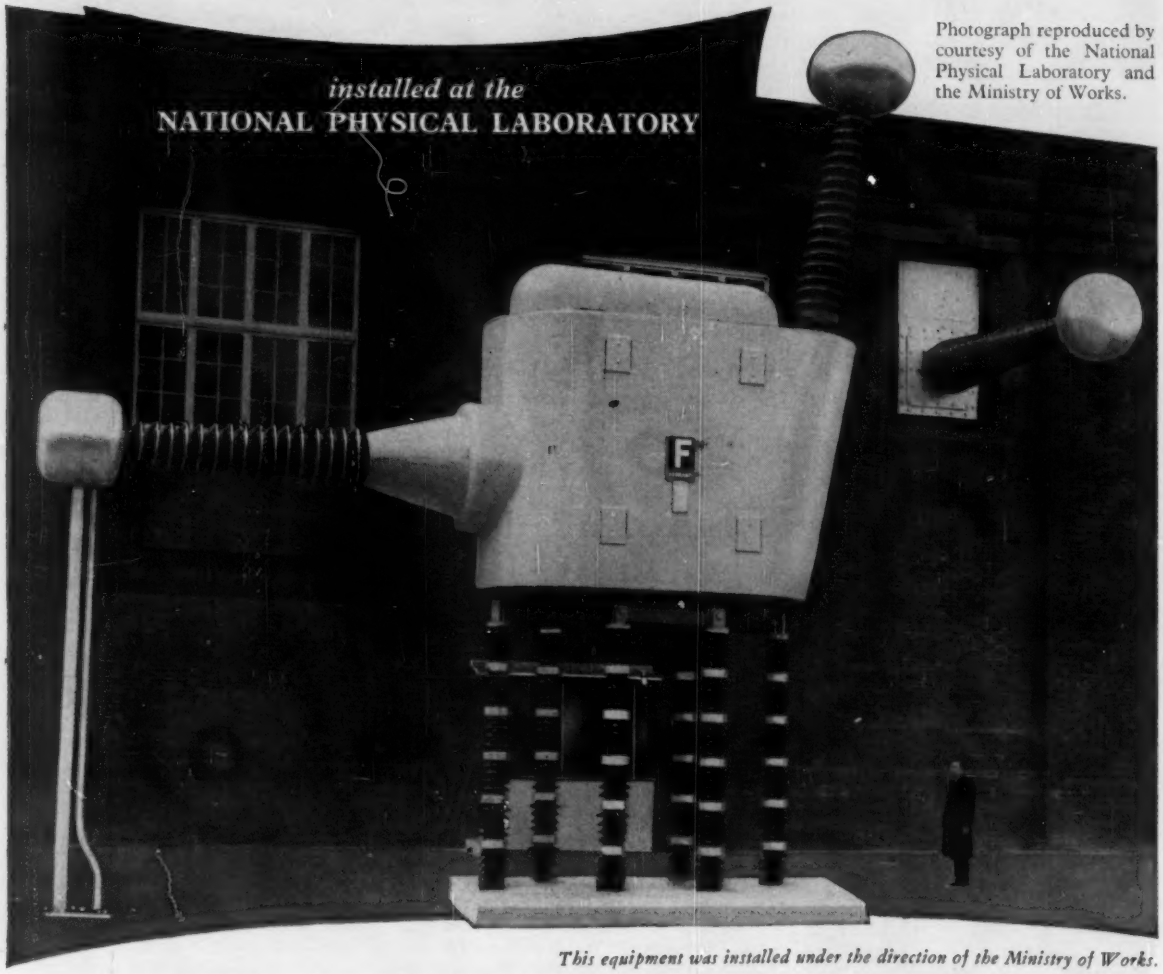
COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

☐ Have representative contact me.

1,000,000 VOLT FERRANTI TESTING TRANSFORMER



Photograph reproduced by courtesy of the National Physical Laboratory and the Ministry of Works.

This equipment was installed under the direction of the Ministry of Works.

THE HIGHEST VOLTAGE OUTDOOR TESTING TRANSFORMER IN THE UNITED KINGDOM

A 1,000,000 Volt Ferranti Testing Transformer operating with the tank at a potential of 500,000 Volts above earth. The transformer is mounted on 6 columns of insulators at a height of 12 feet from ground level. The overall height of the complete equipment is 36 feet. Associated with the equipment is a 1,000,000 Volt wall bushing, 36 feet in length, through which the supply is carried to the test laboratories.

Ferranti are specialists in the manufacture of High Voltage A.C., D.C. and Impulse Testing Equipments for all kinds of research and routine testing and are backed by over 70 years' experience in the manufacture and development of electrical apparatus.

FERRANTI LTD., Head Office and Plant: HOLLINWOOD · LANCASHIRE · ENGLAND

London Office: KERN HOUSE · 36 KINGSWAY · W.C.2

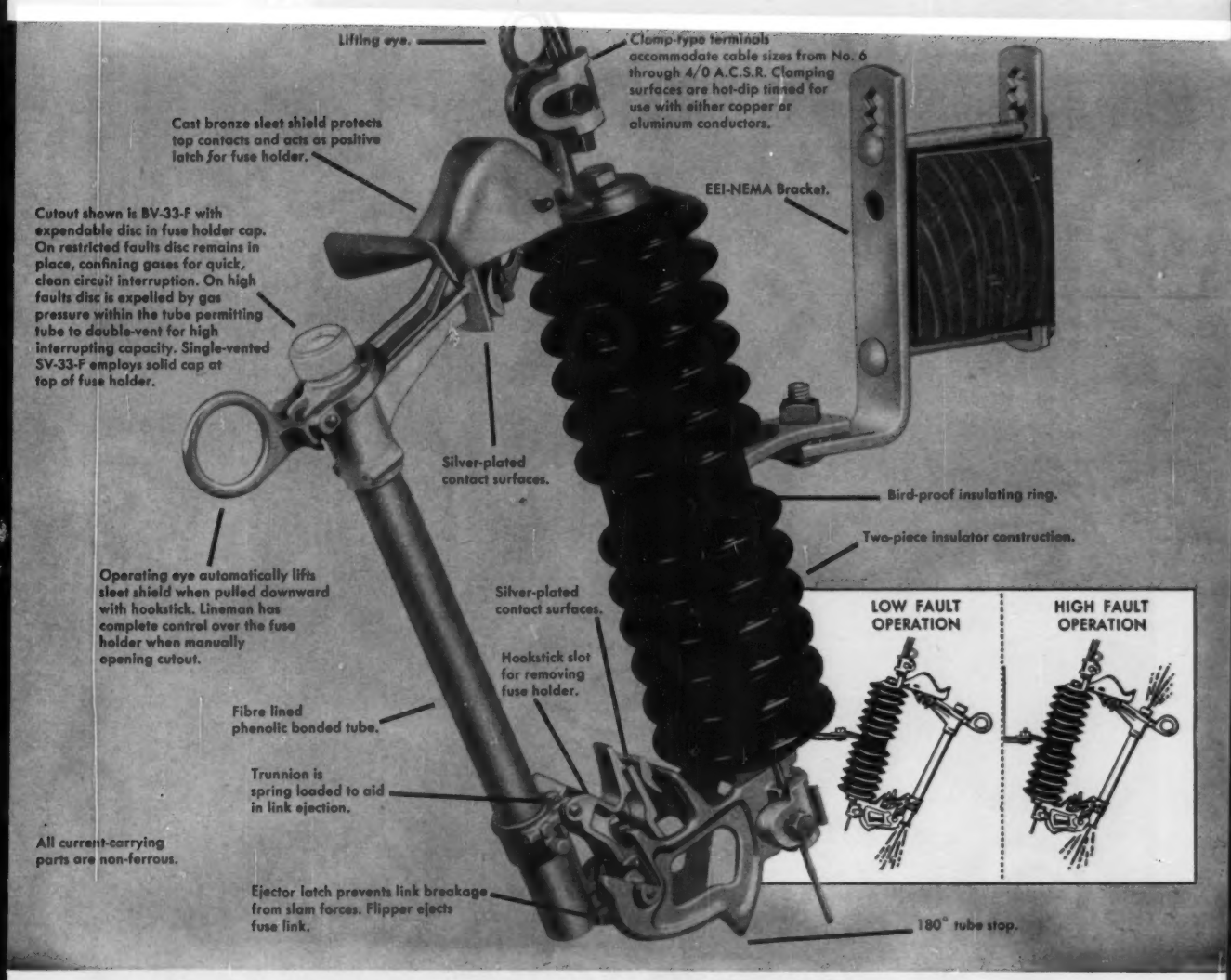
NEW YORK: Ferranti Electric Inc., 30 Rockefeller Plaza, N.Y.20

TORONTO: Ferranti Electric Ltd., Mount Dennis, Toronto 15, Ontario

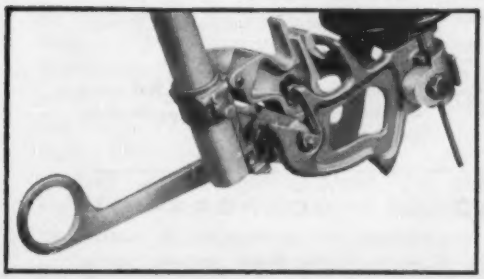
FT204-2

PLANTS

MOSTON: Manchester 10, England.
WYTHENSHAWE: Cheshire, England.
WEST GORTON: Manchester 12, England.
GEM MILL: Chadderton, Lancs., England.
EDINBURGH: Ferry Road, Edinburgh 5, Scotland.
DUNDEE: Kings Cross Road, Dundee, Scotland.


Lifting eye.
Clamp-type terminals accommodate cable sizes from No. 6 through 4/0 A.C.S.R. Clamping surfaces are hot-dip tinned for use with either copper or aluminum conductors.
Cast bronze sleet shield protects top contacts and acts as positive latch for fuse holder.
EEI-NEMA Bracket.
Cutout shown is BV-33-F with expendable disc in fuse holder cap. On restricted faults disc remains in place, confining gases for quick, clean circuit interruption. On high faults disc is expelled by gas pressure within the tube permitting tube to double-vent for high interrupting capacity. Single-vented SV-33-F employs solid cap at top of fuse holder.
Silver-plated contact surfaces.
Bird-proof insulating ring.
Two-piece insulator construction.
Operating eye automatically lifts sleet shield when pulled downward with hookstick. Lineman has complete control over the fuse holder when manually opening cutout.
Silver-plated contact surfaces.
Hookstick slot for removing fuse holder.
Fibre lined phenolic bonded tube.
Trunnion is spring loaded to aid in link ejection.
All current-carrying parts are non-ferrous.
Ejector latch prevents link breakage from slam forces. Flipper ejects fuse link.
180° tube stop.
LOW FAULT OPERATION
HIGH FAULT OPERATION

Southern States new cutout offers double action for double protection



THE LBV-33-F LOAD BREAK CUTOUT

Has all the features of the BV-33-F, including the expendable disc. It is equipped with a load break mechanism which permits it to serve as a load break switch. It is designed for use with universal button head links only in ratings as high as 100 amperes.

Type BV-33-F—5.2, 7.8, 15, 25 kv—100, 200 amps

THE POWERFUL NEW BV-33-F CUTOUT automatically provides protection against restricted as well as heavy faults.

An expendable disc in the fuse holder cap does the trick! On low faults it remains intact, restricting gases within the tube for maximum arc-quenching ability. On high faults the disc blows out, permitting the cutout to double-vent for maximum interrupting capacity.

Compare the features of the BV-33-F with any other cutout. Add to them the double protection it offers, and you have the answer to your cutout requirements.

For complete details, see your local Southern States representative, or write direct for Bulletin 570-C.

LIVE BETTER ELECTRICALLY

IN CANADA: Dominion Cutout Co., Ltd., Toronto

SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

Do you worry about control circuit installation costs WHEN YOU'RE PLAYING GOLF?

You shouldn't! Why not concentrate instead on breaking 90?

Many of your control circuit installation problems, including the cost problem, can be solved if you'll specify and use Rockbestos PNR 600 volt control cable — the cable that's been proven over and over again through more than 14,000,000 feet of installations.

Here's why Rockbestos PNR is your best buy in control cables:

- With it you save on conduit and fittings, cut installation costs.
- Rockbestos PNR lets you pull a 12 conductor control cable in conduit which is now carrying ordinary six or seven conductor cable.
- It's 46% smaller in area — 28% smaller in diameter than conventional control cable.
- It's flexible from 167° to —67°F.
- It's light, easy to handle, pull through conduits.

Get the complete Rockbestos PNR story — write now for detailed specifications and application data.

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT
NEW YORK, CLEVELAND, CHICAGO, PITTSBURGH, LOS ANGELES, DETROIT, ST. LOUIS, ATLANTA, DALLAS, OAKLAND, SEATTLE

ROCKBESTOS

PERMANENTLY INSULATED WIRES AND CABLES

PNR Small Diameter Control Cable

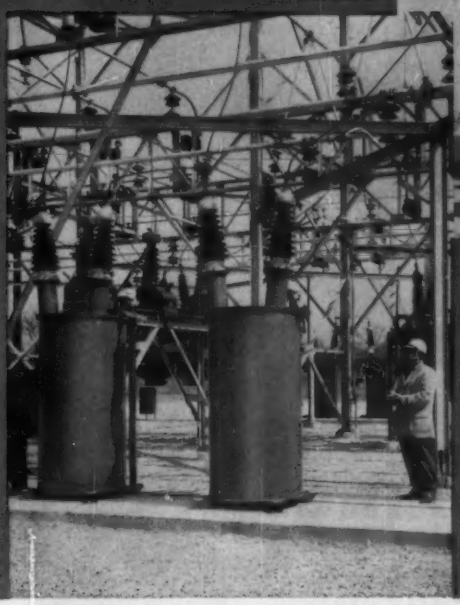
MORE THAN 14,000,000 FEET IN SERVICE

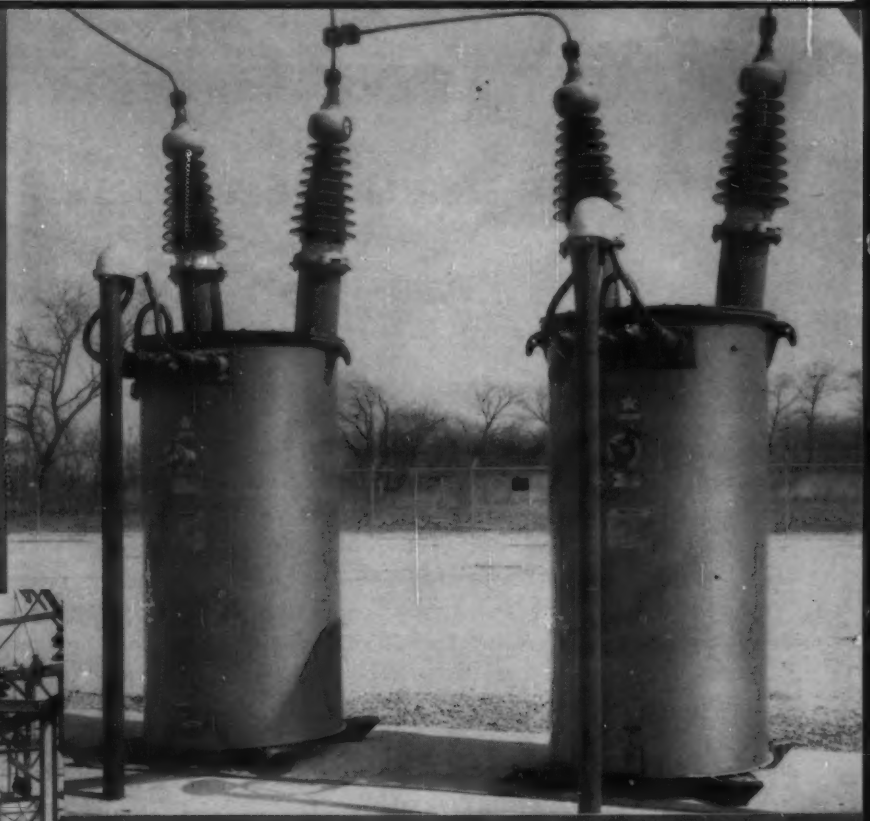
For its own

SUBSTATION

POWER

CONTROL . . .





LONG ISLAND LIGHTING
CHOSE HIGH VOLTAGE

Pole Star

DISTRIBUTION TRANSFORMERS

There is no other type of distribution transformer installation in which reliability is so vital. In this case, not just a few homes or commercial establishments are involved—but rather, operation of the entire Ruland Road Substation of Long Island Lighting Company, which ties a new 138-kv feeder into a 69-kv feeder.

Long Island Lighting chose four high voltage Pole Stars for this important installation, which provides "control power" for the fans, pumps, and tap changer of the main substation transformer, for the heaters and battery chargers of the switchgear, and for station lighting. The Pole Stars are 100-kva, 67-kv units connected as two open delta banks. The low voltage is 120/240 volts.

Pole Stars have won a fast-growing reputation for dependability in high voltage applications because they possess the *ruggedness* that is needed for day-in-day-out operation. For more details or a quotation on that next order, contact Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

McGRAW EDISON

Pole Stars are available in all standard single-phase sizes from 3 through 500 kva, through 67,000 volts.

PENNSYLVANIA TRANSFORMERS — POLE STAR

PENNSYLVANIA DISTRIBUTION TRANSFORMERS

LAYER-AFTER-LAYER

OF RELIABILITY GOES INTO

LAPP POC* BUSHINGS

FOR YOUR SYSTEM

Lapp POC* Bushings conform to ASA Standards. The small diameters specified by these standards permit design of new transformers and circuit-breakers of lighter weight, smaller size . . . and by use of inexpensive adapters, provide broad interchangeability for replacement in old equipment.

Lapp's solution to this reduced-diameter requirement is the POC* Bushing. In this design, a condenser series distributes voltage stress evenly and safely throughout the insulation. The condenser core is wound, as shown below, of multiple concentric layers of high-dielectric paper, interleafed with spaced aluminum foil layers. Paper is high-vacuum-impregnated and surrounded with oil, and the entire paper-oil core totally enclosed; the porcelain shank will not track or deteriorate under leakage current caused by contamination of equipment tank oil.

Paper-oil insulation ranks first in reliability as insulation for highest voltage cables, potheads and bushings. Lapp uses it in POC* Bushings at all voltages from 15kv up. Won't you sleep better with their extra safety margin protecting *your* system?

Lapp Insulator Co., Inc., LeRoy, N. Y.

Lapp

POC*

BUSHINGS

***PAPER-OIL CONDENSER TYPE**
TOTALLY-ENCLOSED CORE
ASA STANDARD

HOW ANCHOR HELPED SOLVE A PROBLEM IN SAN ANTONIO

The City Public Service Board of San Antonio needed a new double circuit 138 KV line from a power plant to a sub station. But the sub station was centered in a highly developed area.

Right of way was impossible for double circuit towers.

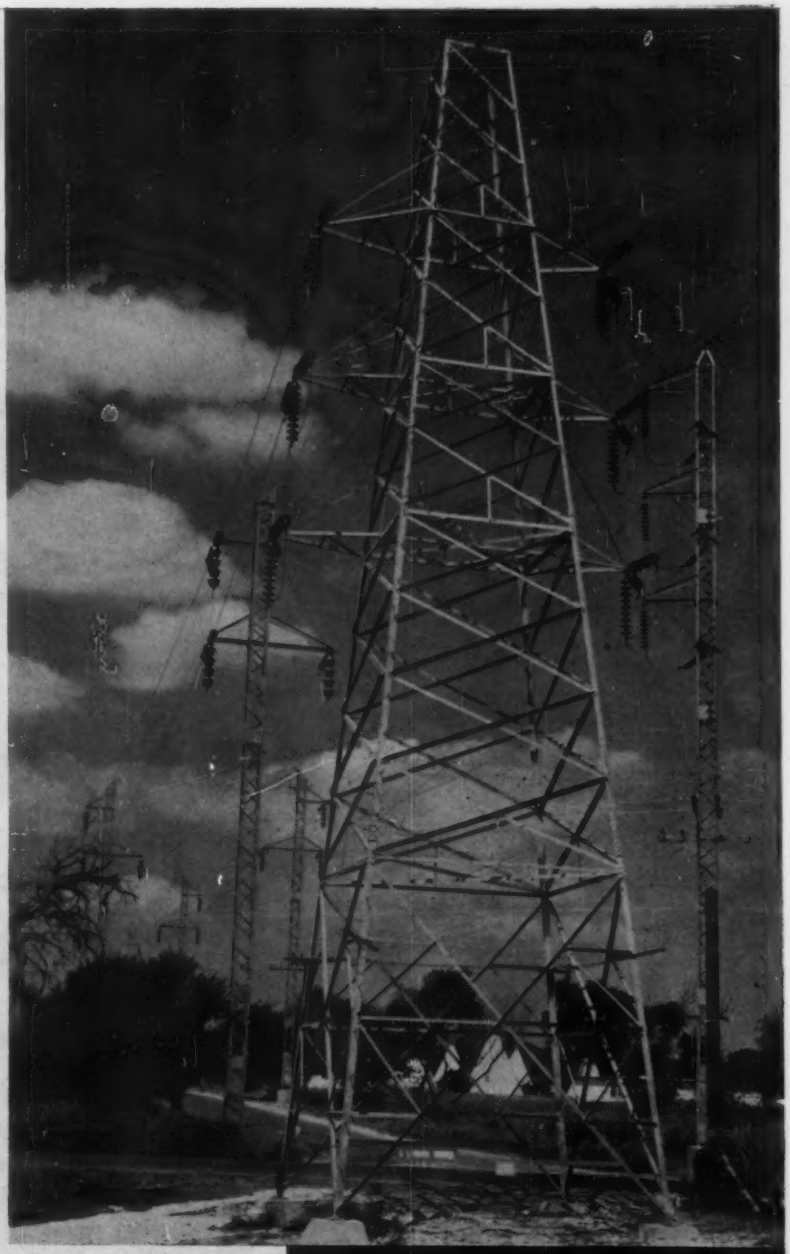
The solution –

Use a double circuit in the outlying area . . . Then a two-foot square single circuit along each side of the street to the sub station.

Anchor designed – and full scale tested – such a single circuit . . . and the 138 KV line got through!

At Anchor, service and quality is the slide rule of every operation.

A. O. [illegible], VICE PRESIDENT AND PRODUCTION MANAGER



ANCHOR METALS INC.

HURST, TEXAS • FORT MADISON, IOWA

50 YEARS OF FINE TOOL MAKING

Upon completion of our first half century of dedicated service to the craftsmen of the free world, we wish to thank our millions of customers and thousands of distributors and dealers for the vital part they have played. From the original wrench of 1907, the Crescent line has grown to include hundreds of the most widely used hand tools. We pledge that the quality-of-product which has brought us thus far will be our criteria for future standards.

CRESCENT TOOLS
Give Wings to Work
Sign of the Artisan
Symbol of Excellence ®

Crescent is our trade-mark, registered in the United States and abroad. For wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

at NEW LOW PRICES!

These prices mean new economy for you, because they make the annual cost of Copperweld* Guy Strand even less than before—and it always has cost less per year of service than ordinary strand.

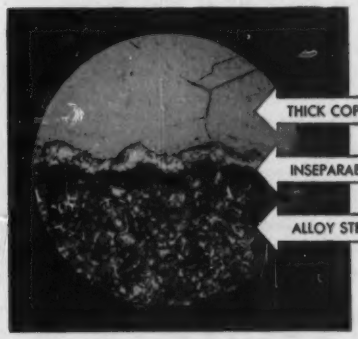
Copperweld Type M Guy Strand is easy to handle. It is flexible and pliable—can be readily bent, served, moused or clamped. The heavy copper sheath of each wire, inseparably molten-welded to the alloy steel core by the exclusive Copperweld process, will not crack, flake or peel.

Seven strengths are available: 3-wire strand in strengths of 2.2M and 4M; 7-wire strand in strengths of 6M, 8M, 10M, 12.5M and 16M. Start now to save more by using Copperweld Type M Guy Strand. Our field engineers will be glad to tell you about it.

*Trade Mark

COPPERWELD STEEL COMPANY WIRE AND CABLE DIVISION *Glassport, Pa.*

For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York



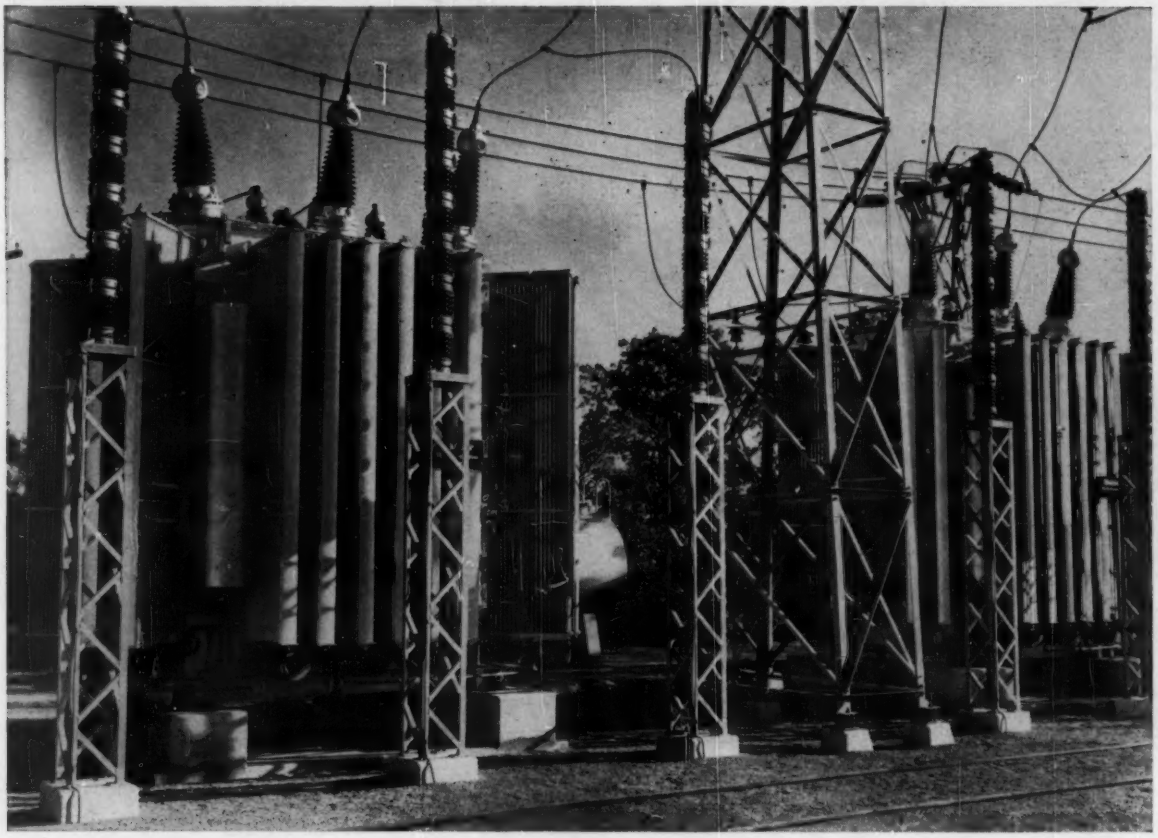
microphotograph of weld area of Copperweld Wire, greatly enlarged

—AND REMEMBER,

THE MOLTEN-WELD

MEANS

proved dependability and long life



New Wagner-equipped substation adds system capacity for Alabama Power Company

Utility company planning to meet increasing residential loads calls for ever-increasing capacity and more and more transmission and distribution substations.

Alabama Power Company has recently completed the installation of two new Wagner power transformers at its North Auburn Substation. These transformers are rated 22,500 kva, 110,000 to 69,000 volts, 3 phase, 60 cycle.

The choice of Wagner Transformers for this installation points up the fact that more and more power companies are looking to Wagner for their transformer needs.

Wagner builds standard and special power transformers to meet practically all kva and voltage requirements. You might consider taking advantage of the savings in time and dollars by specifying Wagner standardized units for medium sized transformers. Check ASA Standards C57.12.

Consult Wagner about your next power transformer installation. 32 branch offices are at your service. Wagner Bulletins TU-181 and TU-16D tell the whole story. Write for your copies today.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

757-9

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

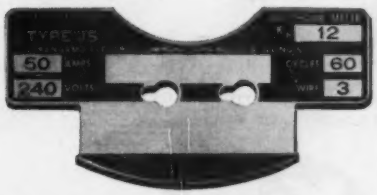
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

Sangamo Class 200 Meters

PROVED by 17 years of performance

With singlephase residential loads growing... with more and more 200 ampere service entrance equipment being installed every day, attention is being drawn to Class 200 Singlephase Meters. Yet the development of 200 ampere meters is nothing new. Sangamo singlephase meters with accurate 200 ampere capacity have been in use for 17 years!

THE NAMEPLATES TELL THE STORY...



IN 1940, Sangamo introduced the Type J Meter which pioneered modern singlephase meter design. The 50 amp J Meter gave excellent curves up to loads of 200 amperes. These meters have been on power company lines for 17 years.

IN 1955, Sangamo presented the J2 Meter—the first standard extended range meter in the industry. The 50 amp J2 Meter offered straight line accuracy up to 200 amperes with only 18 starting watts. These 200 ampere capacity meters are on your lines today.

NOW Sangamo offers its Class 200, 30 ampere J2S Meter at the same price as Class 100 Meters—with proven accuracy to 200 amperes, slow disk speed, high starting torque, low starting watts. Choose this *proven* Class 200 Meter to protect your investment in metering.

NOW...THEY'RE GUARANTEED FOR LIFE!

The electrical and mechanical stability of Sangamo Watthour Meters is so great that an unprecedented lifetime guarantee covering materials, workmanship and bearing systems—is offered on all new singlephase and polyphase meters using Sangamo's ball and jewel bearing system.

LIVE BETTER ELECTRICALLY

SANGAMO

ELECTRIC COMPANY *Springfield, Illinois*

JM57-10

Panel Mounting that age only makes tougher!

K&M EBONIZED ASBESTOS

A real toughie, K&M Ebonized Asbestos resists shattering, vibration, shock, and temperature changes. Both mechanical and dielectric strengths are high. Yet, it's practical, easy to work, and low-cost.

Its ruggedness comes from the asbestos fibers and portland cement which make it durable and long-lasting. Molded under pressure, it's then impregnated with special insulating compound. Comes in 42″ x 96″ and 48″ x 96″ sheets—⅛″ to 4″ in thickness. You can have it cut to your specific sizes, and beveled, too!

See your K&M Distributor today for complete details, or write to us.

K·M
BEST IN ASBESTOS

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

NEW

YORK-HOOVER *RANGER*

makes

TOUGH "SPOT" DIGGING

easy!

1. Digging operation *against wall or pole* to be replaced.
2. Digging operation well *below* the truck level.
3. Digging operation on bank *above* truck level.
4. Digging operation on the *opposite side* of a high fence.

GET THE COMPLETE "RANGER" STORY. WRITE FOR BULLETIN NO. 944 TODAY!

BODY DIVISION
YORK-HOOVER CORPORATION
YORK, PENNSYLVANIA

CREATIVE ENGINEERING FOR THE PUBLIC UTILITY INDUSTRY SINCE 1892

MEN RESPONSIBLE FOR POWER DISTRIBUTION KNOW...

IF IT'S PARANITE IT'S RIGHT!

From Aerial to Underground Wire and Cable

Over a period of 67 years Paranite has steadily built a reputation for quality wire products and dependable service. Overhead . . . or underground . . . there's a Paranite cable specifically engineered to perform in excess of your requirements. SUPER-PARARITE® butyl rubber insulations have been developed to withstand conditions in your area. Copper or aluminum bare or weatherproof cables . . . ACSR or line wire (formerly products of Midland Wire Corporation) are also available.

PARANITE WIRE AND CABLE

DIVISION ESSEX WIRE CORPORATION

FORT WAYNE 6, INDIANA

MANUFACTURING PLANTS: ***Birmingham, Ala.; Anaheim, Calif.: Jonesboro, Ind.; Marion, Ind.; Tiffin, Ohio**

Warehouses* and Sales Offices

Atlanta, Georgia
*Chicago, Illinois
Cleveland, Ohio
Dallas, Texas
*Detroit, Michigan
Hartford, Connecticut
Indianapolis, Indiana
*Kansas City, Missouri
*Los Angeles, California
*Newark, New Jersey
Omaha, Nebraska
*Portland, Oregon
Upper Darby (Philadelphia,) Pa.
Phoenix, Arizona
Rochester, New York
*Saint Louis, Missouri
*San Francisco, California
Springfield, Illinois

TIME IS THE MEASURE OF ALL WOOD PRESERVATION

In business–as in pleasure–it's important to safeguard your investment in wood. Service records show that AMCRECO pressure treatment still provides the longest and most practical protection.

AMCRECO
PRESSURE TREATED WOOD PRODUCTS

AMERICAN CREOSOTING CORPORATION LOUISVILLE 2, KENTUCKY
SUBSIDIARY OF UNION BAG-CAMP PAPER CORPORATION

an entirely new type of hot-line clamp

WEAVER

PS (PRESSURE SENSITIVE) CLAMPS

* *ni-cad coated*

The design is based on a proven engineering principle—never before used in hot-line clamps. This principle promises to eliminate loose connections. The clamps stay tight without springs or lock washers!

The NI-CAD coating prevents oxidation troubles on bi-metal connections . . . no inserts or pads are needed!

High-strength heat treated aluminum body. Exceptionally long wire bearing surface on both main line and tap connections. Fully lubricated with corrosion-resistant lubricant.

Non-coated PS clamps available for A1 to A1.

You stock one type clamp (2 sizes) instead of four or five.

SAMPLES ARE AVAILABLE FOR TESTING—WRITE TODAY.

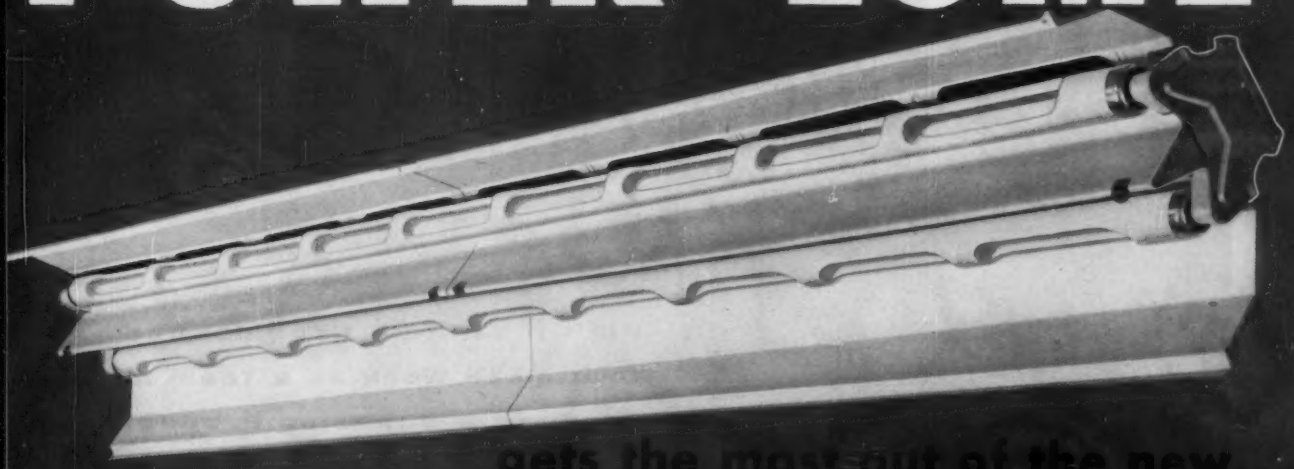
* extremely heavy coating of cadmium and other corrosion resistant elements.

J. A. WEAVER Company

CE 1-8100
2110 HOWARD ST.
ST. LOUIS 6, MO.

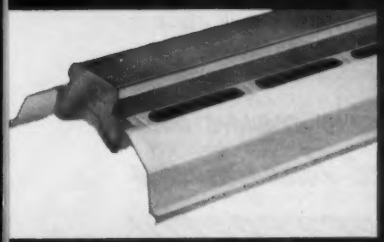
Wheeler ULTRA-NEW

POWER-LUME

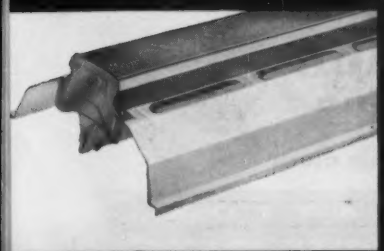


gets the most out of the new

POWER-GROOVE LAMPS



POWER-LUME F



POWER-LUME V

Distributed exclusively through electrical wholesalers.

Delivers **TWICE** the amount of lumen output per foot of lamp length!

Today's big news in industrial lighting. 2 outstanding Wheeler units — Power-Lume F and Power-Lume V — specifically designed to utilize *fully* the extra illuminating power of the new Power Groove Lamp. Both fixtures are designed for all medium to high mounting applications . . . provide more comfortable seeing, cooler lamp operation, thanks to Wheeler's unique diffuser apertures that direct MORE than 20% of the light upwards.

POWER-LUME F (porcelain reflectors) are ideal for use where rough work is being performed and shielding is unimportant. Where reduced brightness is required, Power-Lume F with aluminum reflectors does the job best.

POWER-LUME V (with drawn one-piece porcelain reflectors) with increased shielding is the perfect lighting answer for those areas where more difficult seeing tasks are being performed. For maximum seeing comfort, Power-Lume V with drawn one-piece aluminum reflector is recommended.

Write for New Product Data Sheet No. 100 D
NEWEST UNIT IN WHEELER'S "PACKAGE PLAN" LIGHTING

WHEELER REFLECTOR CO. (Division of Franklin Research Corp.)
275 Congress St., Boston, Mass.

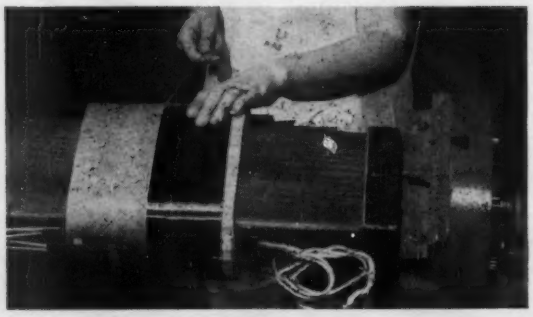
FROM TOP TO BOTTOM, INSIDE AND OUT

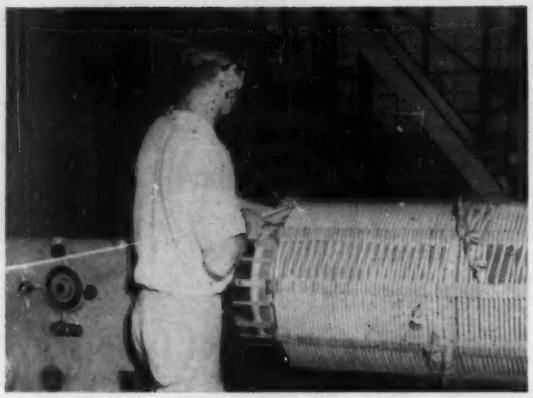
CENTRAL

TRANSFORMERS

ARE BUILT BY EXPERTS

Every step of the way!





Highly Skilled, Experienced Craftsmen Work as a Team to Produce a Superior Product

For instance, let's visit Central's coil-winding department. Here you will find specially-trained workers with years of experience in the fine art of coil-winding. These workers recognize that the coil is the very heart of a transformer. They understand the vital importance of correct tension to insure that insulation is uniformly smooth and even. They take pride in their handiwork . . . with the result that the "heart" of every Central Transformer is as perfectly made as skilled human hands, using fine materials and modern machinery, can make it.

Just one more reason why Central Transformers are PREFERRED!

WE DESIGN AND MANUFACTURE QUALITY TRANSFORMERS —NOTHING ELSE

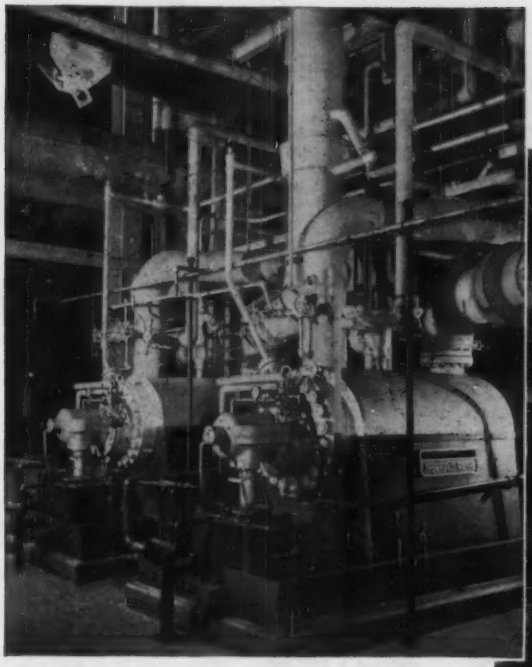
Central

TRANSFORMER CORPORATION

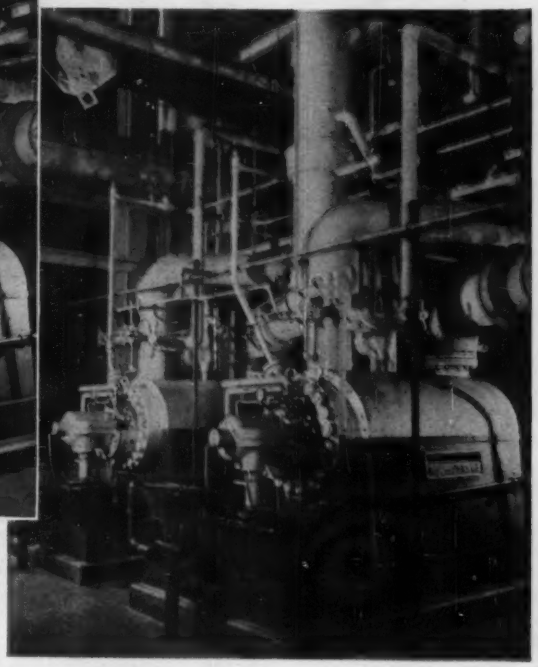
PINE BLUFF, ARKANSAS

Telephone JEfferson 4-5332

Sales Offices in Principal Cities



Two Ingersoll-Rand 11-stage CHTA boiler feed pumps now serving Unit No. 1 at Milliken Station.



Duplicate CHTA 11-stage boiler feed pumps are on order for Unit No. 2, now under construction.

2 MORE IR BOILER FEED PUMPS

for Unit No. 2 at MILLIKEN STATION

TO SERVE rapidly growing loads in the Finger Lakes area, New York State Electric & Gas Corporation is *doubling* the capacity of Milliken Station which went on line in Sept., 1955. Unit No. 2, now under construction, will be a duplicate of Unit No. 1 — consisting of a 135,000 kw turbo-generator with a capability of more than 150,000 kw.

The boiler feed pumps are also duplicates — two Ingersoll-Rand 11-stage CHTA units, each rated 1165 gpm at 5530 ft total head and driven at 3570 rpm by a 2000 hp motor. The I-R air compressors shown at the right for Unit No. 1 are also being duplicated for Unit No. 2.

Repeat orders like this are tangible *proof* of complete satisfaction with the units already in service. In leading power plants from coast to coast, I-R high-pressure boiler feed pumps with the exclusive unit-type rotor assembly are making impressive records of trouble-free performance — and resulting in repeat orders again and again.

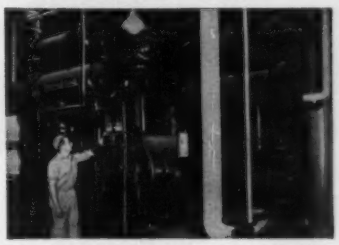
For the best solution to your boiler feed pump problems, just get in touch with your nearest I-R representative.

Ingersoll-Rand

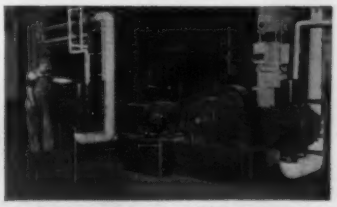
11 Broadway, New York 4, N. Y.

10-682

Other I-R Equipment at Milliken Station



One of two Ingersoll-Rand Class TVH soot-blowing compressors serving Unit No. 1 at Milliken Station.



Two Ingersoll-Rand Class ES-NL compressors with non-lubricated cylinders, supplying oil-free instrument air for Unit No. 1. Another ES unit with standard oil-lubricated cylinder provides general plant air.

COMPRESSORS • GAS & DIESEL ENGINES • PUMPS • AIR & ELECTRIC TOOLS • CONDENSERS • VACUUM EQUIPMENT • ROCK DRILLS

MOLONEY

Corrugated Tank Network Transformers

Smaller Size • Ease of Maintenance • Rugged, Durable Tank

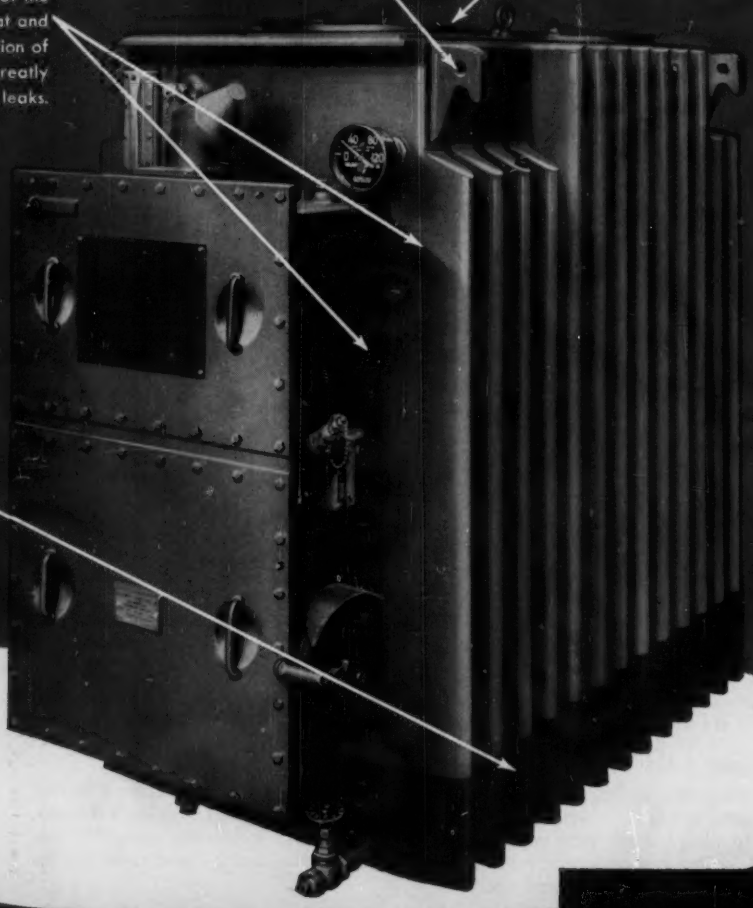
These features help to reduce the cost of your network system. Less original cost results from the use of smaller vaults and the cost of operation is held to a minimum because of the ease of maintenance and the long tank life. This type of design is available in sizes up to 1000 KVA. Corrugated tank network transformers are designed either according to EEI-NEMA Standards or according to your specific requirements.

Tanks may be cleaned from above and repainting is easier as there are no inaccessible areas.

Lifting hooks do not extend beyond the maximum measurements of the tank.

Tank covers and handholes are welded on, absolutely sealing tank against the entrance of moisture.

Corrugated tank wall is made of one piece of steel. Continuous seam welds are made only at the four corners of the tank, around the low voltage throat and high voltage switch and at the junction of the tank walls and the bottom, greatly reducing the possibility of leaks.



Vertical tank surfaces shed corrosive matter and consequently contribute to longer tank life.

Undercoating of the tank base and the lower part of the tank wall gives maximum protection against rust and corrosion.

MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

FACTORIES AT ST. LOUIS 30, MO., AND TORONTO, ONT., CANADA

Are Utilities Depression Proof?

Optimism of business men is often affected not only by their own company balance sheet data but by their personal market ventures. A layman investor in today's stock market cannot ignore the daily statistics and the business forecasts. He would not be human if his perspective were not seriously affected by these events.

Fortunately the utility managers, most of whom stick closely to the industry for investment, have not been faced with the halving of market values that has become commonplace in other industries. Even in electrical equipment, the deterioration in stock values has been relatively light. Of course, the relative health and growth of the industry is behind this stability.

Beyond the fact that industry growth continues upward, we have excellent illustrations of stability in earlier recessions. In 1938 total revenue made no gains due to a drop of 16% in industrial kwhr sales but income held steady. In 1949 revenues increased 7% and gross income 14% as industrial sales dropped 3%. Again in 1954, industrial energy sales showed a slight decrease excluding AEC sales. Residential kwhr sales continued at around 12%, commercial dropped to 6%, but total revenue was up 7% and gross income was up 12%.

The record of the past, particularly that of the 1954 recession should be a very good guide to 1958. However, the prognostications for 1958 do not as yet show as much of a decline in business for the year as a whole as we experienced in 1954.

In 1954 industrial production index dropped 11 percentage points from 134 to 125. Even the most pessimistic forecasts for 1958 show a drop at the very bottom of about 7 points indicating that the average production for the year should be about equal to 1957. Our current forecasts indicate that industrial energy sales may not drop below 1957 and that residential and commercial will gain at about the same rate as in 1957. In 1958 a number of utilities will receive rate increases and at the same time will be putting a record amount of efficient generating capacity on the line.

There is no evidence that labor costs will increase beyond the corresponding gains in revenue and other operating expenses have always been held in line. The evidence would seem to be on the side of continued gains in earnings. These earnings should again be sufficient to cover the higher capital investment which will be on the books of the utilities.

This year the capital expenditures have held fairly close to earlier predictions. According to returns from a substantial portion of the utilities, they dropped below estimates only in distribution expenditures. They indicate that in 1958, capital expenditures will increase about 8% which is close to our predictions.

We see nothing to fear in 1958 and much to be thankful for. Those who have cast their lot with the electrical industry should look ahead with assurance that, whatever problems exist, they will disappear before many months. Certainly the utilities as a market or as a way of life will turn in another record performance.

The TVA Titan in '58: Carte Blanche

- **Unique 25-year-old giant faces dilemma of 15% annual growth in power demand as congressional new capacity appropriations halt**
- **The agency's proponents are optimistic on passage of revenue bond financing; private companies seeks guarantee of greater controls**

When Congress reconvenes next week, included in its unfinished business will be the decision of how the Tennessee Valley Authority is to finance its further power expansion.

The decision making will be preceded by possibly the hottest controversy the power field has seen in years.

From the investor-owned companies' standpoint, passage of TVA revenue bond financing measures like the Senate-passed Kerr bill portends a new era of unlimited expansion for the 25-year old giant.

TVA members and backers say a "workable" self-financing bill is vital to national defense and a necessity to meet load growth of some 800,000 kw a year in the area, not counting federal defense requirements.

Here's how the potential blockbuster has developed, and the differing views of the two factions:

I. The Drought of the Fifties

TVA hasn't begun construction of any new generating facilities, such as the Kingston Steam Plant shown here, since 1953. The controversy over how new facilities are to be financed has remained unresolved in this period while the need for additional power grows more urgent.

TVA says its consumers are increasing their use of power at about 15% a year. At this rate, the system was rapidly approaching the point in the past few years where it would not have been able to meet peak demands.

Thus in 1956, the agency began using its power revenues to build additional capacity at existing plants, as the law authorizes. In this manner it was able to authorize start of construction during 1957 of three plant units totaling 1,215,000 kw.

This assured customer power requirements would be met through 1959-60.

In the face of continued self-financing delay, however, TVA recently authorized construction of another 500,000-kw addition at its Widows Creek Plant.

But, like other power systems, TVA's power revenues are insufficient to meet all its future power needs, the agency says. Power revenues alone will be inadequate to meet a demand of about a 750,000-kw/year rate for the five years beginning with 1960.

To meet this expansion need, the Senate last session passed S1869 sponsored by Sen Kerr (D-Okla). Awaiting House action this session is another bond financing proposal (HR 4266) sponsored by Rep Clifford Davis (D-Tenn). The Davis bill is more pro-TVA in its terms than the Kerr bill.

Chances are that a bond-financing proposal for TVA will carry considerable appeal in Congress in the coming session. It has the virtue of providing for TVA's needs without adding the cost to the federal budget.

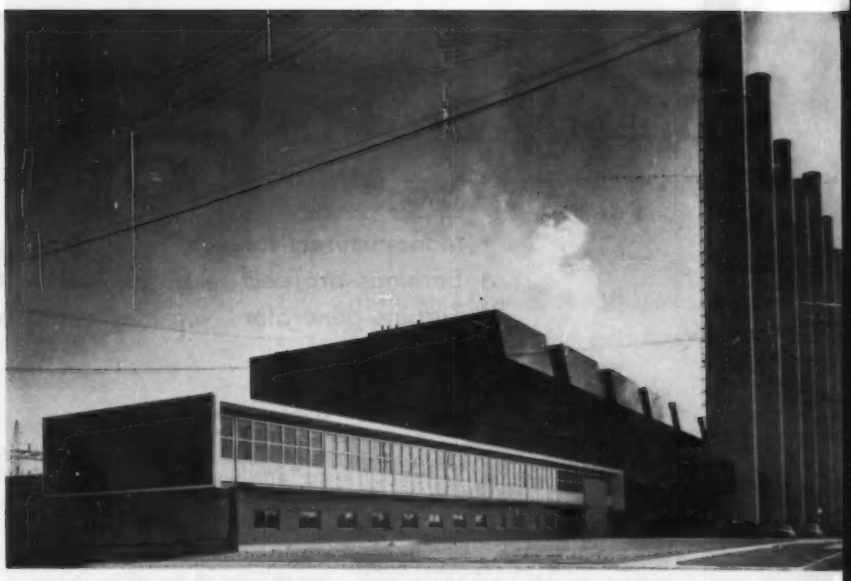
Undoubtedly, it also will be argued that bond financing—any bond financing—will be essential in

These Controls Needed in Self Financing Bill: Oakes

Charles Oakes, president of Pennsylvania P&L, says these controls are needed for any TVA bond-financing plan:

1. Provision for TVA to pay interest on past appropriations.
2. Repay past appropriations (now over $2 billion).
3. Federal government should not be permitted to buy TVA bonds.
4. Interest on bonds issued by TVA should be taxable.
5. TVA should pay full tax equivalent paid by private utilities to put it on same footing as power firms.
6. TVA rates should be regulated by the Federal Power Commission. FPC should have authority to require that rates to the general public cover full cost of providing service.
7. TVA should pay costs incurred by other federal agencies for TVA employees, including cost of employee's compensation claims, unemployment benefits, and civil service retirement.
8. Strict limitation of TVA to its present service area.
9. Strengthened congressional control over TVA.

or Controls?



the face of growing defense expenditures to meet Russian advances.

Generally it's agreed by all sides that TVA should no longer be dependent on congressional appropriations for future expansion, if it must expand. Bond financing is the answer to TVA's problem, most agree. But there all agreement ends.

These are the basic issues at stake:

1. Limiting TVA's geographical growth.

2. Maintaining adequate congressional control over TVA's expansion plans.

3. Assuring repayment of the public investment in TVA.

4. Equalizing competition between TVA and private utilities.

II. Evolution of a Titan

Behind the fight over the pending bond financing legislation is the gamut of TVA battles going back to 1933 when it was created. Originally TVA was authorized to:

- Improve navigability of the Tennessee River.
- Provide river flood control.
- Provide for reforestation and proper use of marginal lands.
- Boost the valley's agricultural and industrial development.
- Operate the government's Muscle Shoals, Ala., properties.
- Build generating facilities and transmission lines consistent with purposes of promoting navigation and controlling floods and to "avoid the waste of water power."

TVA, the largest utility operation in the U. S. and probably in the world, will undoubtedly continue to grow as its service area prospers.

The agency now encompasses 80,000 square miles, about double the area of the Tennessee River Basin. This growth, achieved largely by acquiring all or parts of existing utilities, now extends into seven states. The last major acquisition was in 1945.

One real change in the TVA character is its switch to coal. As of last September, TVA's 9,931,151 kw of installed capacity was made up of 3,643,901 kw hydro and 6,287,250 kw coal-fired steam.

Power, originally a supplementary phase, today has become TVA's major business.

III. The Views for Controls

The Administration, electric companies, and others see too little control of TVA's expansion in the bond financing proposals.

The Kerr bill proposes issuance of $750 million of bonds, proceeds of which would go into added power facilities in the next five years.

First of all, critics of the measure charge, these additional facilities would never need specific approval by Congress. As the bill reads, if no objection to any proposed construction occurs within 60 days, TVA can proceed.

Next, there is no geographical limitation. On the contrary, the Kerr bill virtually invites further expansion. It provides TVA could serve territory within the Tennessee River Basin area not now served; extend service in counties either partially served now by TVA or partially within the drainage basin area; and extend service to rural co-ops in counties contiguous to either the drainage or service area.

These concessions mean TVA could more than double its service area to 192,000 square miles.

The Davis bill places no ceiling on the amount of bonds that TVA can issue and no geographical limitation whatsoever.

There are other criticisms.

TVA, alone of the big federal power agencies, does not figure interest on federal investment in fixing its power charges. Both the Kerr and Davis bills provide that TVA pay interest on the appropriation investment at a rate equal to the average interest paid by the Treasury on its total marketable obligations.

Charles Oakes, president of Pennsylvania Power & Light Co, and other critics say this is inadequate. The payments would be based only on appropriations and would not include accumulated net income, now well over $400 million, they contend. And the proposed rate is lower than justified by the nature of TVA.

Both bills cancel an existing mandatory provision under the Government Corporations Appropriation Act of 1948 for TVA to repay to the Treasury the appropriation investment in power facilities over a 40-year period.

Finally, both bills would free TVA from practically all controls exercised by Congress, the Budget Bureau and the Treasury.

Steady Growth Characterizes Industry's

- Manufacturers foresee normal sales gains hinged to utility expansion
- Earnings prospect in slower first half again has producers worried
- Turbine-generators, wire and cable, other products will fare well

A year of steady growth is in the cards for 1958 for makers of electric utility equipment. This is the general outlook, according to an Electrical World roundup of chief executives' predictions.

The informal survey points up expectations of a slightly slower first half of the year followed by a pick-up in sales in the last six months of 1958. Subsequent issues of EW will describe the outlook of other firms as they become available.

Here's what the manufacturing company officers expect:

Aluminum Co of America

An increase in aluminum consumption over 1957 is anticipated by Alcoa, said Pres Frank L. Magee. Present abundance of the metal will contribute to "broadened usage in both new and existing applications," he stated. Alcoa's installed capacity is rated at 792,500 tons annually at the close of '57. This is 42% of the U. S. total, Magee noted.

Burndy Corp

"In our utility-industrial division, we expect 1958 to be 8% over 1957—the first half to be about the same as last year and the second half substantially above," said Vice Pres E. E. DeMarsh. This outlook is partly influenced by general business, and partly by new products to be introduced, he added.

Copperweld Steel Co

"Our customers will receive substantial benefits from Copperweld's research and modernization program," observed William W. Ege, vice president in charge of wire & cable division. The program, "coupled with a plentiful supply of copper and steel, will improve service, resulting in a good normal activity for 1958," Ege said.

General Electric Co

The year ahead will be "challenging" for businessmen. But it will be as good a year as 1957, "perhaps even better," for the economy as a whole and for electrical manufacturers.

This was the gist of Ralph J. Cordiner's outlook talk in New York City earlier this month. The General Electric Co president expects 1957 to be the best year in its history. "Over-all, there is every indication that sales and earnings will top the 1956 performance of $4.09 billion in sales and $214 million in earnings."

The backlog of orders for turbine-generators is as high as last year's, he said, adding that this is true of the company's order position generally.

He said plant and equipment expenditures by the firm will total about $150 million in both 1957 and 1958.

Cordiner observed that congressmen have asked why American industries and utilities don't move faster on atomic power. With our abundance of fossil fuel and low-cost steam station power production, we don't have the incentive, he implied, to push atomic development as fast as others less favorably disposed.

We have not seen the end of the intense price competition in apparatus that has marked the last few years, he predicted. There are no "administered prices" in the electrical industry, Cordiner noted, observing that this was "good for GE and good for the customer." He doesn't foresee any substantial cuts in the price of power apparatus, however.

Jasper Blackburn Corp

"Sales will equal 1957," K. R. Way, vice president, forecasted. Earnings will be down, however, "because of increased labor costs and competitive market pressures." The firm plans to hold inventory at 1957 levels and plans additional outlay in labor-saving devices, Way said.

Kuhlman Electric Co

Said G. R. Fluehr, president: "We have great faith in the American economy and, in particular, the growth of electric utilities. We expect our businesses in this field to continue to expand in 1958."

Moloney Electric Co

"Transformer volume for 1958 should be slightly ahead of 1957," predicted J. J. Mullen, Jr, president. "Heavy inventory positions and financing difficulties of utilities are clearing up and should provide a more active market for distribution transformers," he said.

Reynolds Metals Co

A "breakthrough" to mass production techniques will be ushering in a new era in the aluminum industry. Pres Richard S. Reynolds expressed this prediction recently. "The present over-supply of aluminum is not a liability but an asset" in meeting the challenge of mass production techniques," he said.

John A. Roebling's Sons Corp

"Our outlook for 1958 is optimistic—based on further stability of raw material prices, continued heavy demand for electric power; and thus an increased usage of wire and cable for expansion, modernization, and new applications." This is the view of S. E. Yeaton, general product manager of Roebling's electrical wire division.

Sangamo Electric Co

Pres C. H. Lamphier predicted that "power equipment sales for

'58 Outlook

1958 should increase about 15% due primarily to the introduction of Sangamo's new line of polyphase meters and power capacitors."

Southern States Equipment Co

"We are anticipating another good year in 1958 and plan for approximately a 25% increase in gross sales," said J. E. Cordell, sales vice president. "A portion of this increase will be directly attributable to increased and intensified territorial coverage, provided by new agents."

Westinghouse Electric Corp

Over-all steady growth of the electrical industry will be the big factor in Westinghouse Electric Corp's expectations for a peak sales year in 1958. The company's billings will hit about $2 billion for products sold in 1957.

This is the view of Gwilym A. Price, president and chairman of the board. In his year-end statement he noted predictions for a slight dip in industrial production in 1958, a year in which "American business will face major problems."

For the electric industry, though, "optimism . . . is based on an expected increase in total kwhr sales to more than 600 billion, an increase of almost 8% above record 1957," Price said.

New orders of heavy apparatus may fall below 1957, the second best year in the firm's history for apparatus bookings, he said. Its share of this business, plus, a "substantial" backlog, will bring a moderate gain in sales in 1958.

Continued rapid growth in atomic power will take place for Westinghouse, Price predicted, "even though it will take some time before atomic power will be able to compete with other electric power installations." Billings in this department will almost double those of 1956, he said.

A modest increase in sales of consumer products is anticipated by Westinghouse.

Price said, "It appears that total output of goods and services will show a slight increase over this year's record."

New Generation Soars, Will Set Record in '58

EEI Chief McAfee cites all-time high in construction and production in a "dynamic" industry

The ten years between 1937 and 1947 found electric utilities installing some 16.25 million kw of new generating capability. But this amount of capacity will go into service in 12 months of 1958 —a record that will eclipse any previous year's additions for the industry.

And during the next decade more than 130 million kw of net generating capability will be added to the present total of 135 million kw.

Those are some of the figures of an industry with "progressive and dynamic qualities," said J. W. McAfee, Edison Electric Institute president and head of Union Electric Co.

Additions scheduled or on order for '58 and later include almost 40 million kw in steam plants and 5 million kw in hydro installations. Investor-owned companies will put in 37 million kw of this, and the remainder is scheduled by the federal government and public agencies, McAfee said.

Budget: $3.9 Billion

To pay for these projects and the transmission and distribution links, utilities are budgeting $3.9 billion for 1958, he said. The power will supply the growing demands of residential customers who at year's end used energy at an average annual rate of 3,164 kwhr.

The gross revenue of investor-owned electric companies totaled $8 billion in 1957 compared with $7.5 billion in 1956. Net income was $1.4 billion this year vs. $1.3 billion in 1956. Companies paid $1.8 billion in federal, state, and local taxes this year.

Rate increases were granted to nine electric companies during the first 11 months of 1957. Thirty-one cases were brought before commissions in this period; 22 are still pending.

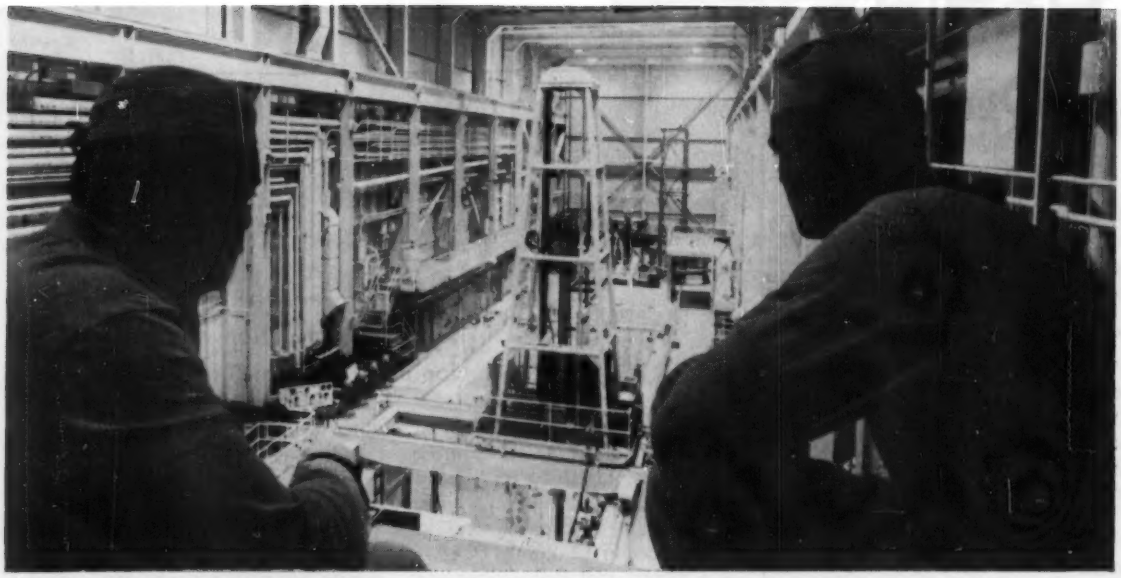
Over 100 electric utility companies are now actively engaged in phases of nuclear power research, development, and construction.

"Sixty companies were participating in the planning or construction of 13 nuclear power plants" at year's end, McAfee said. Seven plants either in operation or under construction are expected to have a combined capacity of over 750 Mw and involve company expenditures of more than $285 million.

Interpreting the Industry

McAfee drew some interpretations from his statistical summary of the industry's progress: Items:

- In the past seven years, or less than one-tenth of its history, electricity generating capability and production have each increased by over 90%, while sales have doubled.
- Since the start of 1951, average annual use of electricity per residential customer has increased by 1,334 kwhr. The increase in this period alone is greater than total use per residential customer only 11 years ago.
- Residential and rural customers totaled 48.5 million at the end of 1957 and commercial and industrial, 6.5 million. During the past ten years, residential and rural customers have increased by 15.4 million.
- In the past ten years, purchases of electricity have yielded $13-billion in taxes.



Atomic derrick in fuel handling canal building inserts uranium elements and . . .

Shippingport Puts Out Full Power

Waning U. S. prestige received a healthy shot in the arm on Wednesday, December 18, when the world's first full-scale atomic electric power plant devoted exclusively to peacetime uses began operating on a test basis at Shippingport, Pa.

The historical event occurred at 12:39 AM, as the generator was synchronized with the Duquesne Light Co system. Within three hours Shippingport was producing more than the 8,000 kw it consumes for auxiliary power and was feeding power through Duquesne Light lines to consumers in the Pittsburgh area.

Power continued to rise so that by 7 AM output reached 12,100 kw. It exceeded 20,000 kw that evening. And by December 23, it had reached 68,000 kw gross.

The testing program, which now has brought net station output to the design capacity of 60,000 kw, is expected to extend over the next few weeks. This will enable engineers from Atomic Energy Commission, Duquesne Light, and Westinghouse Electric Corp to determine the operating characteristics of the plant and establish its dependability.

Cost of the Shippingport project, excluding the $47.5 spent on research and development, is estimated at $72.5 million. This includes the first loading of atomic fuel.

The reactor alone came to $55 million, $50 million of which was supplied by AEC and $5 million by Duquesne Light. The remaining $17.5 million is estimated by Duquesne Light to be the cost of the conventional side of the plant, which includes a 100,000-kw turbine generator.

The new plant's reactor is modeled on the pressurized water type reactor used in the first atomic submarine, the Nautilus.

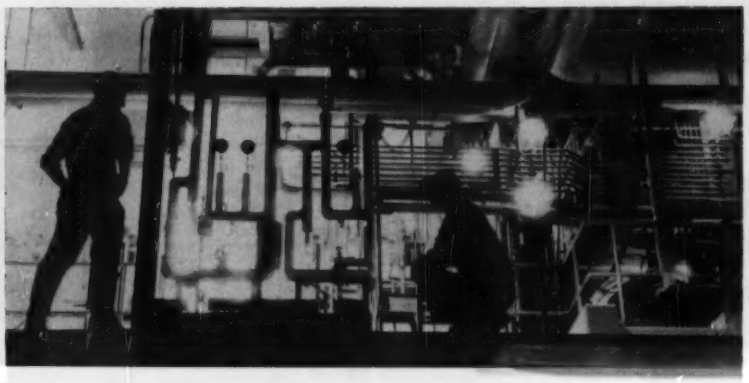
The plant is composed of a single reactor heat source with four main coolant loops, three of which are needed to produce 60,000 kw. Each loop has a single-stage centrifugal canned-motor pump, a heat exchanger section of a steam generator, and 16-in. gate-type isolation valves.

High-purity light water, under a pressure of 2000 psi, acts as coolant and moderator. The flow through the nuclear core is 45,000 gpm for three loops. At full power the inlet water temperature to the reactor is 508 F. Outlet temperature is 542 F.

The main coolant flows through the inside of many hundreds of small stainless-steel tubes in the heat-exchanger section of the steam generators. These heat-exchanger tubes are surrounded by the water of the secondary system, which is heated by the primary coolant in the tubes.

Simple exterior belies . . .

Inner complexities, such as this maze of 100,000 ft of pipe



U. S. Hydro Tempo Takes an Upturn

- **Nearly 22,000 Mw of new hydro capacity is planned or underway**
- **Fast building pace maintained on rivers in the Pacific Northwest**

According to Edison Electric Institute, almost 22,000 Mw of new hydroelectric capacity in projects under the Federal Power Commission's jurisdiction are in planning stages or under construction.

Of this, about 13,200 Mw are involved in projects already under license, 7,520 Mw of which was under construction or scheduled to begin in 1957. And about 45% of the work started or due to begin in 1957 was by investor-owned companies.

These figures are compiled from FPC reports, orders, and releases. EEI's wrap-up in 1956 showed about 17,000 Mw of new capacity planned or underway.

Bulk of the building is taking place in the Northwest. In central Oregon, Portland General Electric Co's $25-million project (below) on the Deschutes River produced power just recently. The 120-Mw facility will be completed in mid-'58.

Plans to construct two dams on the Sultan River to provide power and water for the Everett, Wash., area have received a preliminary FPC permit for Snohomish County PUD. The project would develop 140 Mw at an estimated cost of more than $40 million.

New Plan for Wells Project

Puget Sound Power & Light Co, which withdrew its original bid several years ago for construction of a hydro dam on the Columbia at Wells in favor of Douglas County PUD, may return to the project as a partner. Puget Power has offered to advance funds to complete engineering work started by Kaiser Aluminum & Chemical Corp. Kaiser has withdrawn, no longer interested in locating a plant at the damsite. Under the new set-up, Puget Power would be allotted one-third of 414 Mw produced by the proposed dam.

At Idaho Power Co's $63-million Brownlee Dam on the Snake River, construction is 72% completed. Building of the dam may set a new speed record, according to Morrison-Knudsen Co, Inc. Power will be produced next summer, 34 months after ground was broken.

Pacific Power & Light Co's project on the Lewis River in southwestern Washington is taking form rapidly. The Swift earthfill dam is approaching the 50% complete phase. Cost of the development will hit $51 million by the late-1958 completion date.

Montana Power Co's 869-ft-long concrete-gravity Cochrane Dam on the Missouri River is now more than half completed, the utility reports.

Mammoth Contract, Jaybird Are California Highlights

In California, Southern California Edison Co, U. S. Bureau of Reclamation, and Department of the Interior have executed a contract under which Edison can operate its proposed Mammoth Pool Project on the San Joaquin River. The contract permits Edison to store and release water from upper San Joaquin reservoirs.

Construction will begin soon on the company's $49.6-million addition to its Big Creek project in the High Sierra. This will include a dam, 126-Mw powerhouse, and water storage reservoir.

Sacramento Municipal Utility District held ceremonies marking start of construction of the 80-Mw Jaybird Powerhouse near Placerville. The American River development will ultimately produce 200 Mw at a cost of about $100 million.

Alabama Power Co's proposal for development of the Warrior River has been sanctioned by the FPC. The $37-million Lewis Smith Dam project will have initial capacity of 22.5 Mw with provision for a second similar unit. The $121-million Coosa River development will add some 312 Mw of capacity for Alabama Power. The company's board of directors recently approved the FPC license.

Georgia Power Co has applied for a $1-million addition to the Morgan Falls Dam.

120 MW IS CAPACITY OF PORTLAND GE'S PELTON DAM

Growth in the Valley . . .

TVA reports that its distributors serve over 214 industrial firms having demands of more than 1,000 kw. This represents a 91% increase over the 112 such firms served in June of 1950. The aggregate demand today is 733,960 kw, compared to 293,439 kw in 1950.

Meanwhile, installed capacity of the TVA system has passed the 10-million-kw mark. When John Sevier Steam Plant's No. 4 unit went into commercial operation recently, the rated capacity was boosted to 10,169,485 kw.

. . . And in the Northwest

Grant County PUD has decided to increase the initial installed capacity of Priest Rapids Dam to 798,500 kw. Decision calls for installing two more generators, increasing peaking capacity by 166,000 kw to 830,000 kw. Since they'll be paid for from unexpended funds in the contingency fund, no additional bonds will have to be issued.

In Snohomish County, the PUD has received a preliminary FPC permit to study possible power development of two streams. It would develop a total of 62,000 kw by diversion dams at Calligan and Hancock Lakes and a dam on the Tolt River below the site where Seattle soon will build a water storage dam. The PUD also seeks to build two dams on the Sultan River, developing 140,000-kw at a cost of over $40 million.

Electrical Sleep in Russia

Electricity in low voltage doses is being used as a sleep treatment in a Moscow clinic. By means of a new instrument invented by Russian Engineer J. B. Chudoi, electrodes are put onto the patient's eyes (negative pole) and neck (positive pole) and low voltage passes through.

The treatment is used for insomnia, epilepsy, schizophrenia, zyklophrenia, hypertonia, headaches, and other ailments. In some Russian clinics, a small dosage of narcotics is combined with the sleep treatment to put the patient into a deep sleep.

International Link Completed

When the international power connection between Maine Public Service Co and New Brunswick Electric Power Commission went into service recently, it marked the second step in a long range plan for integrating the power systems of Maine and Canada's Maritime Provinces.

The 16.9-mi transmission line "will effect operating economies and permit a reduction in the reserve generating capacity of the two systems," said a Maine PS spokesman.

Negotiations are under way with utilities in Nova Scotia for a tie-in between that province and New Brunswick. The Aroostook County utility also has interconnections with Bangor Hydro-Electric Co and Fraser Paper, Ltd, both in Maine.

Shocked Serpent

When Mrs. G. M. Gregory of Baxter Springs, Kans., reported a big black snake in her meter, people of the Empire District Electric Co were, naturally, rather skeptical.

But investigation by EDE's Claude Alleger revealed the reptile dangling from the meter socket. There were burns on its body.

The snake apparently had crawled up the ground wire which ran up the side of the house, crept into the open plug on the bottom, and turned around when there was no other way to go. When the large part of the snake's body was making the turn it apparently made contact across the 240-v terminals and was electrocuted.

Construction Resumed

Construction was resumed on an office building near Jackson, Mich. The Consumers Power Co structure collapsed in October, 1956, killing ten workers and injuring 15.

A report by an investigating committee attributed the disaster to "human failure."

"From a technical standpoint, no single factor can be pinpointed as the cause of failure," the report said. Aspects of "the design, construction, and supervision of the project and the owner's participation therein," were questioned by the committee.

Herlihy Midcontinent Construction Co, Chicago, was general contractor.

Just Between Friends

A "friendly suit" for collection of $982,213.85 has been brought by Los Angeles Dept of Water & Power against Metropolitan Water District, Southern California.

It seeks a judicial interpretation of a contract between the two agencies for Hoover Dam power.

MWD had turned part of its original allocation to the LA Dept, with provisions for increasing return of the allocation as MWD's needs mounted. MWD's needs rose faster than anticipated. In that event, contract provides for compensatory payments to the LA Dept, but the two haven't been able to agree on an interpretation of the contract formula.

AN ELECTRICAL WORLD STAFF REPORT

Ten Big Decisions for 1958

Every electric utility is deeply involved in nearly all of the ten toughest problems challenging management in 1958. Here the editors analyze the problems and the decisions that must be made to solve them

Take a look at the year 1958 with our editors. You don't need a crystal ball. You can see the forces already working that will shape the demands and the crucial challenges that face utility management in 1958.

The constant pressure of federal power advocates in Congress is exerted to keep nuclear power development under federal domination and also to discourage electric company advertising.

Tremendous growth in the use of air conditioning is causing the utilities' own brand of headaches in the form of steep summer peaks. Declining load factors and rising operating costs are being experienced by many utilities. Mushrooming suburbs and fuller exploitation of downtown real estate puts a terrific crimp in securing rights-of-way and sites for utility expansion. Demands are increasing for higher quality service.

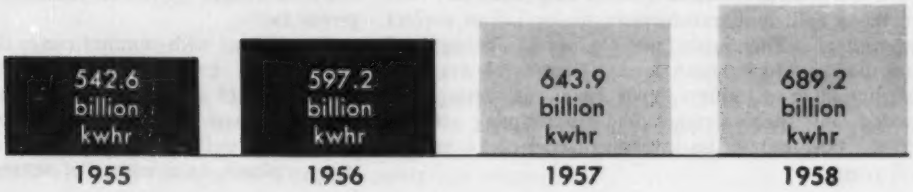
In this staff-written series, we have attempted to bring into focus the extraordinary and vitally important problems facing the industry. Here are the toughest ones:

1. Shall we leave the development of nuclear power to the federal government?
2. Can we lick summer peak problems?
3. Will service quality measure up?
4. Who will pay for utility ads?
5. How fast must electric rates go up?
6. Is research the number one job?
7. How can utilities best change distribution to serve growing home loads?
8. Should utilities take liberalized depreciation?
9. Should all utilities push space heating?
10. Can we break the rights-of-way bottlenecks?

The main purpose of this report is to bring these problems to the attention of the broadest possible industry audience. For whether we are fully aware of it or not, every electric utility is deeply involved in practically every one of these problems. Furthermore, every supervisory and management employee is duty-bound to contribute his best thinking and his best efforts to solving these compelling problems.

In this report we have concentrated on the tough and imminent problems. We have not devoted space to a variety of technical and management problems because they are less pressing than those subjects chosen here. We have not covered the trained manpower problem because we foresee some alleviation of the engineer shortage. We have not covered the financial needs of utilities because we believe that necessary funds will be available on a reasonable basis.

Electric Energy Output Will Rise 7%



1 Will We Leave Atomic Power to the

The big decision in this field for utilities in 1958 will deal with policy rather than economics or engineering. And it may be one of the most important decisions in nuclear power that utilities will ever make. It certainly will be their most important one to date, and it may well determine the degree to which nuclear power will be federalized.

The reason for this is basically two fold:

1. A major change in our nation's nuclear policy is imminent.

2. The utility industry is now in a position to be a formulator rather than a follower of nuclear power development policy.

A major shift in government attitude toward the peace-time atom seems quite apparent because, among other things, the atomic industry's present market is too small for the many sellers of atomic wares. And future market prospects based only on economic incentives seem very discouraging, considering that today's costs of current nuclear power projects are far greater than original estimates.

Add to this the impetus Sputnik has given to the need for prestige in nuclear power development, and it is easily concluded that our government will soon embark on a program of building large nuclear plants.

This will give us nuclear kilowatts for prestige and a subsidized market for our waning nuclear equipment industry.

An approach based on this reasoning may not necessarily be the best one. But utilities will have to face the political facts of life and decide the type and extent of assistance they can render such a program. This is the nuclear task for 1958.

The wisdom of building large nuclear power plants

2 How Can We Lick the Summer-Peak

Power systems are being profoundly affected by the mutual and cumulative effects of weather and weather-sensitive loads on equipment. This is particularly true during summer heat storms when human reactions to heat and humidity multiply fan and air conditioning loads. This creates peaks on system equipment already handicapped in carrying capacity by the weather's effect on air and earth temperatures and moisture.

Air conditioning is now 25% of possible summer load, in the northern states, and will be 35% in 1962, according to the AEIC Power Distribution Committee. Its coincidence factor ranges from 20% at 77F to 95% at 103F. This 95% coincidence factor will be reached only one year in 25, according to predictions of the AEIC committee.

Today's new pattern of summer peaks is already increasing the investment in overhead distribution, underground cable, and generating equipment. And in each of these areas heat storm effects have created the need for re-evaluating load-carrying capacity.

On overhead distribution systems long secondary runs are being split and transformers multiplied to correct low voltage. This arises when air-conditioning load loses diversity during heat storms. Permissible loads on distribution transformers have been cut, ratings increased, and spacing reduced. One company actually added 7,000 units at an investment cost of $4 million in 2 years.

Distribution substation spacing is being reduced also, doubling capacity in one year in some cases. Single-phase primary mains are being shortened to reduce and balance circuit loads. Secondary conductors have climbed from No 6 and 4 to No 2, 1/0, and 2/0.

The highly reactive motor loads of air-conditioning equipment create another problem. Fixed capacitors are likely to reach a saturation commensurate with the limitations of voltage regulation at light load. So, more switched capacitors and other devices will have to be studied for increasing summer capacity at minimum cost.

On underground cable systems summer peak problems are being created by loss of diversity among air-conditioning loads, and among cables in duct banks. Both daily maximum and minimum loads climb; daily peaks last longer, leaving heavily loaded cables little time to cool at night. Earth temperatures are higher too, frustrating efforts to accelerate heat dissipation. Too frequently the result is thermal instability and multiple failure of older cables with high dielectric power factor.

On systems with summer peaks that exceed 85% of winter loads, cable system capability is being derated some 10 to 15% from winter values and design put on a summer basis. Cable, duct bank, and soil-temperature surveys, as well as circuit loading checks, are getting new emphasis as a means of setting capability limits.

Government—or Fight for It?

may seem questionable but it is an endeavor which can use utility experience to the maximum. In addition to their design, construction, and operating experience with large power plants, utilities can point to their own nuclear experience of the last several years.

This latter point, coupled with the fact that the complete scope of the nuclear problem is now defined, is the reason why the utilities' nuclear decisions in 1958 will be the most important they have made to date. For in reality these decisions will be their first major independent ones.

Circumstances beyond its control have till now made the utility industry a follower rather than a formulator of nuclear power development policy. But now the utility industry has the experience and the opportunity to assume greater leadership. What the utility industry decides, if the government embarks on a large-plant program, will have a direct bearing on the federal power question in this country.

This explains the extreme importance of the utility decisions in 1958. The absence of an economic incentive, the tremendous development costs, the scarcity of risk capital to a regulated industry, and the responsibility due stockholders are all vital factors to consider.

But the stakes are high. Not only the future of utility participation in nuclear power, but perhaps the future of the electrical utility industry, may be determined by this decision in 1958.

Individual utilities cannot of course finance such uneconomical undertakings as large nuclear power plants. Partnership with the government will be necessary. But utilities must seize the initiative in an effort to check this possible extension of federal power.

Problems of Weather-Sensitive Loads?

Conductor sizes are being increased; percentage occupancy of ducts in a bank, reduced; poor soil characteristics, corrected.

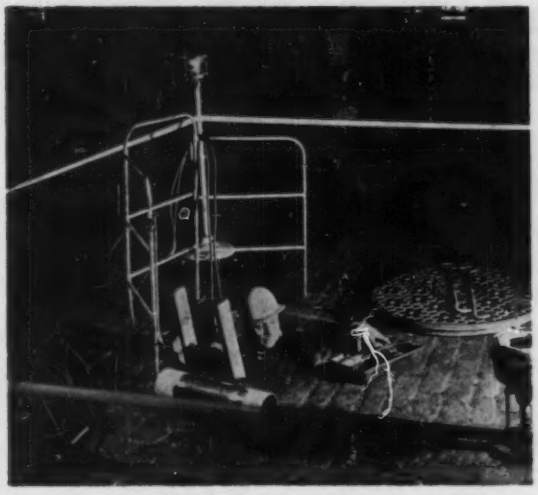
Finally, in the area of generation, heat storm effects are bringing upward revision of traditional summer generation reserve margins, shifts in the schedule outages of machines for maintenance, and a strengthening of some transmission interconnections.

The necessity for more margin is to be seen in the growing swings in load from a hot peak day to a cool minimum-load day. In the past they have ranged around 15% of peak; this year they jumped to 25% on some metropolitan systems, emphasizing the need for more stand-by generation.

The need for more generation reserve, to permit machine outages for maintenance without hazard to service, is recognized. Some operators now feel there is less to be feared from the winter peak than from the summer one. At least it falls in a well defined period. But summer peaks can appear at any time in a four-month period from June to September and can recur several times.

Thus, today, the impact of summer peaks on power systems finds utility management locked in a battle to hold investment and operating costs within reason, while at the same time providing adequate service at reasonable rates.

In 1958, the summer load will become even more dominant in more systems. The need for more system capacity will be the final result, but it should stimulate more activity in the promotion of offsetting loads of a winter variety. We hope it will not mean a concentration on gas air conditioning in summer, which at least one utility has proposed.



3 Will Service Quality Measure up to

Service quality remains an enigma to the utility industry today almost as much as at the industry's birth 75 years ago. Spectacular gains have been won in engineering. But the requirements of new electrical application devices have stiffened to the point where service considered good only a few years ago is inadequate today. Engineers of many utilities are striving to make electric service in the years ahead the faithful servant its users expect.

Continuity will be the focus of future effort. Of the basic ingredients of service quality, it has emerged as the toughest to provide.

The drive for continuity has two distinct facets. One is evaluating the actual needs of various classes of electric customers. The other is measuring the performance of electrical systems used to serve these customers and devising solutions for system deficiencies.

Until recently, continuity requirements for the home were defined largely by customer tolerance of the inconvenience of interruptions. The requirements could be measured in frequency of occurrence and minutes of duration.

Today, for many utility commercial customers, service continuity is essential. Stores, particularly suburban shopping centers, depend on lighting for customer safety, and protection against pilfering and fire.

And, with automation, industrial customers require service so perfect that a system disturbance will not release magnetic chucks or impair the product of precision machines. For such users, minimizing interruptions is not enough. Their needs are measured in severity and duration of voltage deviations.

This requirement has become more acute with decentralization of industry to suburbs and small cities, where supply systems are more exposed to trouble causes and less able to keep resulting disturbances from disrupting processes. Customer annoyance reached the point where one demanded service which would not deviate more than ¾ volt for over one cycle.

At this point, utility and manufacturers' engineers joined to ascertain the degree of precision actually needed in service to automatic machines. They found that typical machines can tolerate 90% voltage dips of 30-cycle duration without damage to tools or work. Despite this tolerance, designers have been applying contactors which drop out within 2 cycles for 50 to 75% dips and, in some cases, in ½ cycle at 74% voltage. Adding time delay to the contactors (or, in difficult cases, resorting to flywheel M-G sets, constant-output voltage transformers, or permanent magnet hold-ins) provides relief for such over-sensitive controls. And magnetic chucks ride through power failures when an auxiliary rectifier-dry-battery device is added.

Electronic computers and data-processing equipment have proved to have the most critical service requirement, showing sensitivity to 1-cycle dips. Solution for this lies in built-in voltage-regulating circuits. However, high-intensity mercury lighting is more troublesome. It blacks out after 2 cycles of 50% voltage but is able to ride through many cycles at 75 to 85% voltage.

How will engineers meet the demand for higher service quality? First of all, they will have to collect and analyze the performance data that have been recorded for years in interruption and trouble reports. Limited ability to factor susceptibility to interruptions and effectiveness of corrective measures into system design has hampered efforts to meet continuity requirements.

Early attempts to assemble such design information

4 Can We Draw the Line in the Political

The electric companies are likely to be faced in 1958 with one of the most insidious drives on their ability to function as a business that has yet come out of the public vs private power fight. The drive is aimed at forcing electric companies to deduct certain institutional advertising expenses from earnings. These costs are now treated as a business expense for rate and tax purposes.

The immediate target of this aim is Electric Company Advertising Program (ECAP) ads. But if legislation covering such advertising is passed it will apply to other ads, whether conducted by individual companies or groups. Also involved will be pamphlets and other informational material.

On the face of it, this objective is naive. It assumes that hurting a company's profits can curtail its activities. But it overlooks the nature of the electric utility industry, and it misjudges the character of the American businessman—to say nothing of the free-enterprise system itself.

Yet the pending move cannot be shrugged aside. At the bottom of it are fundamental issues to be decided: Issues of law, of equity, of principles, and of basic American philosophy.

Demands of Automation and Electrical Living?

were influenced by the form of interruption data and trouble reports at hand. A few companies included all interruptions; others counted only those that locked out circuit breakers. Some counted time lost; others, number of occurrences. But each found its evaluation time-consuming and unsuited to comparison with other companies' data.

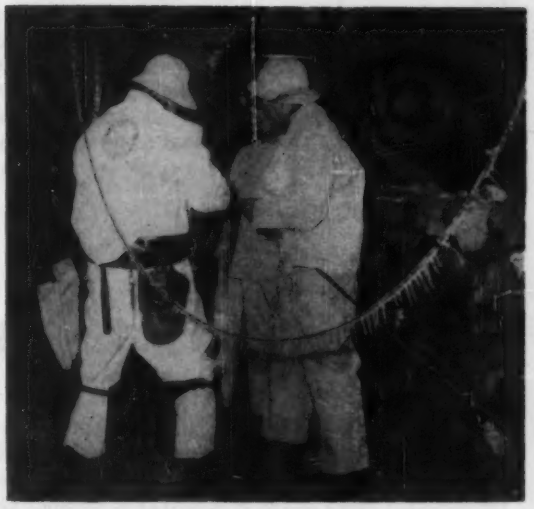
In recent years engineers have tackled this problem anew on an industry level. They are concentrating on establishing a measure of continuity which will be useful to each company in its distribution planning and suitable for comparisons between companies. Their efforts should bear fruit in the coming year.

Widespread adoption of such a standard measure will enable utilities to glean valuable assistance from their piles of trouble reports. And by sharing data with other users they will evaluate many system designs and a greater variety of protective devices. Computers will speed the analysis and compress reams of data into convenient tabulations. These, in turn will help engineers sharpen their aim and apply equipment more effectively in tomorrow's system designs.

How will engineers resolve automated industry's demand for fluctuation-free service?

Obviously any progress in cutting the frequency of faults on the utility system will not only help reduce interruptions but also minimize voltage fluctuations. This "know-how" will derive directly from sharper system design based upon performance data. And knowledge of the quality of service which utilities can reasonably supply will spur designers to build more tolerance into the machines they sell to industrial customers.

Machine-tool designers will benefit by the knowledge that most voltage dips, caused by faults scattered over



an existing system, will be on the order of 20 to 30% but may hang on up to 30 cycles. Dips on the order of 75%, caused by nearby faults on a multiple-path system, will be cut to as little as 3-cycle duration as more modern high-speed circuit breakers are incorporated in system expansions and reinforcements. The combination of faster isolation of faults, produced by more precise relaying and faster breakers, together with system design based on performance data, will give utility engineers the tools to serve tomorrow's automatic factories.

Fight Against Electric Company Ads?

As yet the battle lines have not been drawn. Until they are drawn there can be no fight. But activity is building up in two places: (1) Internal Revenue Service, and (2) Congress.

1. Sen Estes Kefauver has requested the Internal Revenue Service to investigate the manner in which electric companies have charged certain institutional ECAP ads for income tax purposes. Internal Revenue is now carrying out a field study which could provide material for Kefauver to press for some legislative restrictions on electric company advertising.

Internal Revenue feels it is not obligated to report to Kefauver's Antitrust and Monopoly Subcommittee. Whether it will is yet undecided. Actually, Revenue's practice is clear-cut on advertising for lobbying purposes. This cost is not deductible as a business expense for purposes of calculating federal corporate income taxes.

2. Congress may revamp the Lobbying Law. During the last session a bill put in by Sen John McClellan and others (S2191) would have achieved this purpose. It never got out of committee.

This bill carries a section which would have the effect of requiring agencies to register as lobbyists

if they handled $40,000 a year or more of advertising designed to influence legislation. Congressional sources believe there will be action on this bill in 1958.

If an advertising agency registered as a lobbyist because of a specific campaign, Internal Revenue would look at how that expense had been treated for taxes. Thus, while the Lobbying Act change in itself would impose no hardship or restrictions, it would provide Revenue and state regulatory commissions with a ready-made reason for not allowing the ad expense to be recovered through rates or deducted from taxes. On an individual company basis, the expenses probably would not make a great deal of difference on the final balance sheet.

This issue should not be confused with freedom of speech and press or the right to petition. No one has yet said that electric companies should not be allowed to say the things they are saying. Rather, the intention is to make it financially painful for the companies to speak up, in the hopes they will stop.

The issues are confused and complex and extend beyond pure advertising. Lobbying activities are in-

5 How Fast Must Electric Rates Be Raised

It is generally recognized that electric utility rates must continue their upward climb. Certainly the regulatory bodies anticipate this. The rate committee of the National Association of Railroad & Utilities Commissioners wrote recently: "We find that new inflation is causing and will continue to cause a new series of rate increases."

During the first eleven months of 1957 electric companies filed 31 new rate applications before regulatory bodies. Of these, 9 have been granted and 22 are still pending. Over the past 11 years electric companies have made 499 applications for rate increases; 440 were granted, 28 are pending action, 12 withdrawn, and 19 denied.

Among the economic and technical factors bearing on the need for increases, we single out these trends:

• Construction costs will remain at about the same level in '58, even though many inflationary pressures have abated. Wage demands in excess of increased productivity will force manufacturers to hold prices at present levels—perhaps even raise them.

• Technological progress will probably be at a lower rate over the next few years as compared with some of the giant strides that have been made since World War II. Utilities' coal rate, for example, has declined only 0.18 lb per kwhr annually in the past three years, compared with an annual decline of 0.28 lb per kwhr in the preceding years. The cost of fuel per kwhr turned upward in 1956 after a seven-year period of decline.

• Labor costs per manhour also are turning upward. From 1949 to 1957 the hourly earnings of utilities' employees have climbed 53%.

• Cost of new money will remain at a high level. Recent dramatic drop in utility bond yields should

6 Is Research the Number-One Challenge

How much research should an individual utility shoulder? The answer to that question depends upon circumstances, but the need for research is becoming one of management's top problems. There is already wide recognition of this.

Most of the industry's research is being carried by 25% of Edison Electric Institute's member companies, an EEI survey reveals. But a total of 175 companies were participating in at least one project. Sixteen companies had an atomic project only; 39 reported one to five projects; and 44 had a stake in more than five projects. In all, 763 distinct research projects are being worked on, or have been completed recently.

Utility management already is aware of the importance of research. At a recent meeting of the Assn of Edison Illuminating Companies, it was reported that support is being given to research in the fields of EHV cable, soil thermal resistivity, wood poles, revision of ASME steam tables, recovery voltages, corrosion and deposits from combination gases, and coal preparation and utilization.

And to cite only two of several concrete achievements

terpreted differently by Congress and Internal Revenue. Most important of all is the unique nature of the electric utility industry. No other industry is threatened to the same extent by the encroachment of federal power agencies and tax-exempt public power agencies.

For instance, Revenue says that to be deductible an advertising expense must be ordinary and necessary. If, then, one or a group of electric companies campaign through ads against construction of a federal power plant which would threaten their market, is this an ordinary and necessary expense? The fact is that the ad expense has indeed become necessary because power companies see their existence threatened.

This issue will be fought out in Congress. Opponents of the electric companies will try to get all the political mileage they can out of the argument. Charges of misleading and false propaganda will be leveled against the companies.

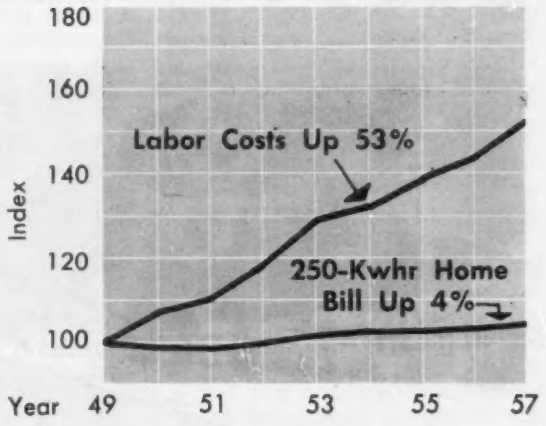
The industry will have to fight for what it believes in—its right to do business and protect its business against unfair competition. If it does this with vigor, the attack against it can be thwarted.

to Keep the Industry Healthy?

not be taken as a portent of a cheap money market in 1958. Present rates are still high and there is no real sign of slackening in demand for funds.

The utility industry during the next 12 years will need approximately $48 billion from outside sources for expansion. To compete with other demands for money, it is essential that its rate of return be kept at a reasonable level. Since World War II the rate of return on net original cost has declined from well over 7% to less than 6%. Many companies, particularly metropolitan ones, show a return much below average.

There is no simple answer to the question: "How fast will electric rates go up?" Certainly, the vital economic trends must be carefully watched. Rate adjustments must be sought where necessary to guard the financial health of the utility and provide for constantly growing service demands.



for Electric Utility Management?

this year, Virginia Electric & Power Co and Ebasco Services proved the accuracy of the sampling procedure in testing watt hour mete. Furthermore, a substantial start was made in studies of residential lighting load.

This is a magnificent record for an industry that frequently is accused of doing nothing to advance its own technology. But this isn't cause for complacency. Too many other problems of the industry need answers that come only through research.

For instance, the field of distribution systems urgently needs research workers to find a more economical system with greater reliability. This is the industry's Number-One problem. There is ample proof that higher voltages all the way to the customer is one answer. But is there a better answer?

In transmission, a higher voltage cable seems to be most urgent. We need to study feasibility of direct current transmission also, even though prospects do appear slight for its proving out.

Power generation offers one of the most extensive fields for study. Nuclear power itself is a vast subject already receiving industry-wide attention. Manufac-

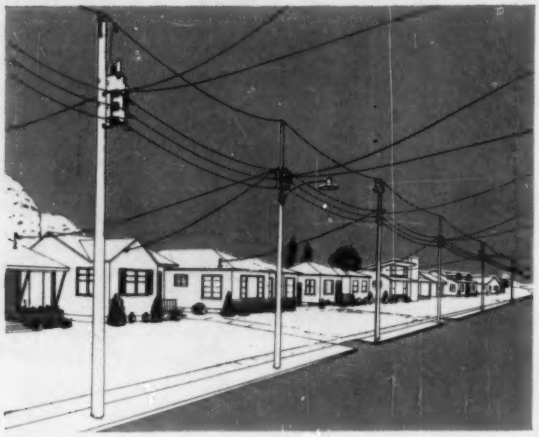
turers should continue exploring economies that can be made in the steam cycle, and utilities must help by providing operating facilities—as has been done in supercritical-pressure, high-temperature ranges. We also need a test installation of a gas-turbine, pressurized-boiler combination. And many more stack-gas problems should be researched from an air-pollution point of view.

We also need to learn the relative economics of delivering coal by train, truck, and pipe line for comparison with the economics of generating power near the coal field and transmitting it to utility systems. We need also a long-range evaluation of fossil-fuel supplies. Can these fuels meet the industry's need until nuclear fuel becomes economical?

More work should go into the study of load characteristics of residential lighting. Today about 25 companies are in this program. The accumulation of data on effects

7 How Can Distribution Be Changed

Present methods of distribution will be on trial in 1958 as utilities face the need for changes to serve the higher residential loads now in prospect. This trial will bring under the spotlight the twin questions of how soon the need will arise and what changes are required to meet it.



Load forecasts put the average annual residential consumption by 1970 at 8,000 kwhr, with individual use soaring to 30,000 kwhr. Corresponding individual demands of 10 kva and higher can become commonplace. Such demands are inherent in homes with electric comfort conditioning—cooling in summer and heating in winter. The distribution systems required for these conditions will force new engineering and management decisions in 1958.

Uppermost in the minds of some engineers who have studied future residential distribution problems is a secondary voltage higher than the present 120/240-v system. To bring this new look to distribution, coordinated planning is required among utilities and manufacturers of electrical appliances and distribution equipment.

To this end, a joint EEI-NEMA committee is considering a higher secondary voltage standard. Its decision is expected early next year. Meanwhile, at

8 Should We Risk Using Liberalized

Utilities, facing the need for aggressive expansion, face also a management dilemma in 1958: To reject or take liberalized tax depreciation, which makes expansion less of a financial burden.

Some utilities see liberalized depreciation as beneficial to them and their customers. But some utilities, considering rulings or the thinking of regulatory bodies, decide not to use liberalized depreciation.

Six jurisdictions out of nine have ruled adversely when liberalized depreciation as a rate-making element was considered. Two states, Indiana and Oklahoma, permitted taxes to be normalized, thus conferring upon the utilities the benefits clearly intended for them by Congress. Other states, including Kentucky, have made special rulings, or have issued orders as yet untested in rate-case proceedings.

More opposition to normalization can be found on the staffs of the Federal Power Commission and Cali-

of electric heating and cooling on utility load must go forward. And as data is accumulated on the re-rating of equipment due to summer loads, this subject itself must begin to receive research attention. Standardization in rate forms would be a fine area for investigation.

Still another area needing attention is sales promotion. Disagreements on cost of service or profitable loads should be eliminated. The matter of how much to spend for promotion is in an area of equal confusion. Sales techniques should be tested through research.

Those are but a small sampling of the myriad subjects that need researching. An answer to any one of those problems will benefit the entire industry.

But it also is the responsibility of each company to shoulder its "fair share" of the research load. This can be done through participation in association and institutional programs, and through determined and individual pursuit of solutions to local problems.

to Serve Growing Residential Loads?

least three utilities are seeking the cooperation of builders in trying out a higher voltage in new high-use areas.

Changes in distribution will not be limited to secondary voltages, however. Individual demands of 10 kva or higher will appear in residential areas now served by 120/240-v systems. These loads will be scattered in areas of lower usage, reducing the economic applicability of a higher secondary voltage. To serve these loads at minimum additional cost, two methods of extending present distribution will present a new look.

In one method, some utilities with a higher saturation of air conditioning may extend phases of existing primaries and thus offer three-phase service in single-phase areas. The new look will come as three-phase blankets an entire area.

Other companies, following the second method, will add transformers and cut back 120/240-v secondaries as demands increase. This approach leads to the ultimate of a transformer per pole, omitting secondary mains. In some cases, as individual demands grow, voltage will be brought through underground cable to transformers on the customer's premises. Several utilities have already applied this method.

One consideration in serving high-use customers will be the need for the highest degree of reliability consistent with reasonable cost. The absolute dependence of all-electric homes on electricity suggests that underground residential distribution has a place in the new look.

Important changes in underground distribution design in recent years have narrowed the cost margin over conventional overhead. This margin will be reduced further as overhead systems are reinforced to meet growing residential demands. But, meanwhile, two utilities are passing this margin on to customers served underground through rates tailored to the cost of underground distribution.

The above avenues of approach provide wide latitude in the design of residential distribution systems for the future. Management and engineering should weigh alternative methods carefully in light of system conditions and growth prospects to pick the best of the new looks.

Depreciation or Take the Safe Course?

fornia Public Utilities Commission. Some opponents say that—in the light of continued utility growth—liberalized depreciation constitutes a "permanent reduction" of taxes, and that only actual taxes can be used to determine cost of service.

Other opponents say liberalized depreciation, via tax deferrals, makes the customer contribute involuntarily to the utility's capital requirements. Such enforced levies are unconstitutional, they say.

But, in referring to accelerated amortization, the FPC made a statement that's equally applicable to liberalized depreciation. The FPC noted that customers will pay the same rates—no more, no less. The U. S. Treasury provides part of the growth capital through tax deferrals.

The current regulatory attitude is not one that will inspire utilities to use liberalized depreciation. In fact, some utilities say candidly they will avoid using the

provisions of the tax law unless they can normalize taxes.

The utility's customers stand to benefit from liberalized depreciation. Wrote Missouri Public Service Commissioner D. D. McDonald in a dissenting opinion of a recent rate order affecting the Missouri Power & Light Co:

"There is no doubt the consumer will be benefited by the company's use of accelerated depreciation for computing its income taxes, even if we allow the company to normalize its income taxes, as the company will be able to use this money for new construction for a number of years interest-free; therefore, less revenue would be required for those years as there would be less debt money to service."

The less new money a company must raise to finance expansion, the stronger its financial position becomes.

9 Will '58 See a Space-Heating Break

Electric space heating and heat pumps may have their biggest year in 1958 as an increasing number of utilities change their attitudes toward them. Their reasons for doing so are not hard to find:

- The constant creep of summer peaks northward, due to the mushrooming of the summer air conditioning load. This load growth shows few signs of slowing down.
- The steady decline in average annual load factor since the early fifties.
- The need for additional income to help support capital expenditures for the next five years.
- The steady narrowing gap between the price of kwhrs and those of competing fuels.

Barring major changes in the nation's economy, we ought to add more than 30,000 electrically heated (resistance) homes and commercial-industrial buildings in 1958. Add to this some 13,000 heat pumps for residential and commercial use.

Electric heating equipment manufacturers—of both resistance heating and heat pumps—see changes aimed at boosting sales. Look for a movement toward standardization by the resistance-equipment people. Idea will be to make their units safer, with more reasonable watts-per-ft ratings. Heat-pump prices may decline slightly, as design and manufacturing refinements reduce size, weight, and noise level. In a few years heat-pump costs will be more in line with a conventional central heating and cooling system.

Important as manufacturers' efforts are, the real electric heating spur will have to come from the utilities. Here are the main points:

Policy—Utilities pondering the swing to electric heat will have to set down policies to guide customers, trade

10 Can Utilities Break the Costly Rights-

Euclid, a suburb of Cleveland, is pulling no punches in its efforts to block Cleveland Electric Illuminating Co from building a 132-kv line along a railroad's lakeshore right-of-way. This case, based on an ordinance requiring lines over 33 kv to be buried, is attracting wide interest as a possible precedent for other cities.

It could be a costly precedent. "If underground installation is adopted as a principle throughout Greater Cleveland we'll have to spend ten times as much as we would for overhead lines," a CEI spokesman says.

Impact of the underground-overhead controversy is just one facet of the problem. An indication of its broader aspects is found in Electrical World's survey of transmission line and R/W spending plans for 1957, 1958, and 1959. Based on replies from 62 major utilities, the industry will spend $1.3 billion for lines and R/W in these three years. This amount includes authorized items only, excludes substation costs.

These extensive expansion plans can be thwarted by the growing resistance of communities and individuals to overhead lines, substations, plants, and other electric utility facilities. And, compounding this problem is the unabated inflation of real estate values.

Right-of-way costs have soared about 450% in recent years, according to the R/W manager of a Southeastern utility. He feels long range planning will help solve this problem. But, he says, "my company has been unable to concentrate on future needs, since we have been too preoccupied with keeping up with present needs." More extensive planning is coming, he adds.

Money will then be raised more economically, benefiting customers.

If a utility is not permitted to normalize taxes for rate-making purposes, and is forced to use lower, actual taxes, rate increases can be delayed but perhaps not indefinitely. Meanwhile the commission personnel have changed, and the likelihood arises that they will rule that customers should not be penalized for the low rates enjoyed by past customers, so let the good-old stockholder shoulder the additional taxes.

Because of this risk, avoiding liberalized methods of Section 167 of the Internal Revenue Act may be the safest course for utilities to take in the absence of a favorable commission ruling on normalized taxes. But the opportunities as outlined for providing these benefits may well be worth the risk.

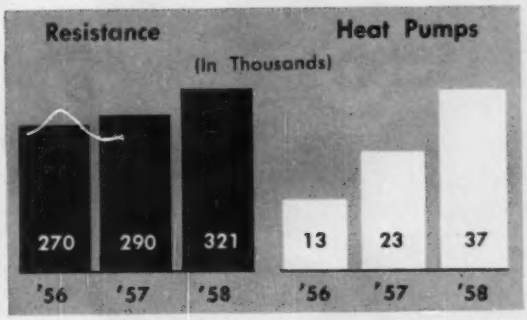
through . . . with Most Utilities Pushing It?

allies, and employees. These will have to cover such essentials as equipment, promotion, insulation, and heat-loss calculations.

Rates—Utilities must realize the importance of price in today's competitive market. Electric heating rates will have to be promotional. In the words of a group of Indiana REA managers: "2¢ competes, but 1½¢ converts."

Promotion—Electric heat will have to be sold and sold hard. Tough competition will be the norm, but it is nothing new and certainly nothing to fear. Of the promoting utilities covered in the 1957 EW survey, almost 90% had to compete with natural gas, and 75% had to battle the fuel oil men.

Perhaps more than anything else, utilities will have to assume the job of protecting the future of the electric space-heating industry. Principal way to do this:



see that only well engineered and installed jobs go on the lines. If power suppliers fail to do this, no one else will take on the job.

of-Way Bottleneck?

The need to map a right-of-way survival plan is beginning to be recognized by utility management. One instance of this recognition is the recently formed real estate section of the Southeastern Electric Exchange.

In 1958 a bolder front will be launched industry-wide to break the right-of-way bottleneck. Electrical World predicts that this action will take place in four areas:

• An independent right-of-way association will be formed for exchanging ideas, workable practices, and successful methods. This group, patterned after or allied with the rapidly growing American Right of Way Association (ARWA), will work only on electric utility problems.

• The internal training of new R/W agents will get a boost from two directions: (1) Adoption of programs like Union Electric Co's in-company and college courses, or Potomac Electric Power Co's broad R/W and utility training; (2) ARWA's cooperation with universities in California and Michigan to speed the day of practical education on all facets of right-of-way.

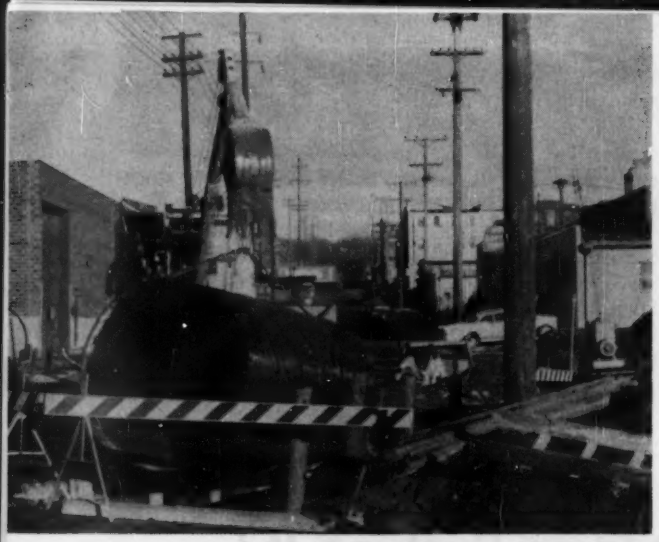
• Utilities will procure R/W more in advance of construction. As one R/W man says, "I'll surely welcome the day that our management and engineers will propose purchases of sites and right-of-way that are not to be constructed upon for at least two years."

• Public relations designed to prevent, as well as put out, R/W fires will gain more emphasis. Progressive utilities will step up an information campaign to educate opinion leaders, legislators, zoning boards, and planning commissions.

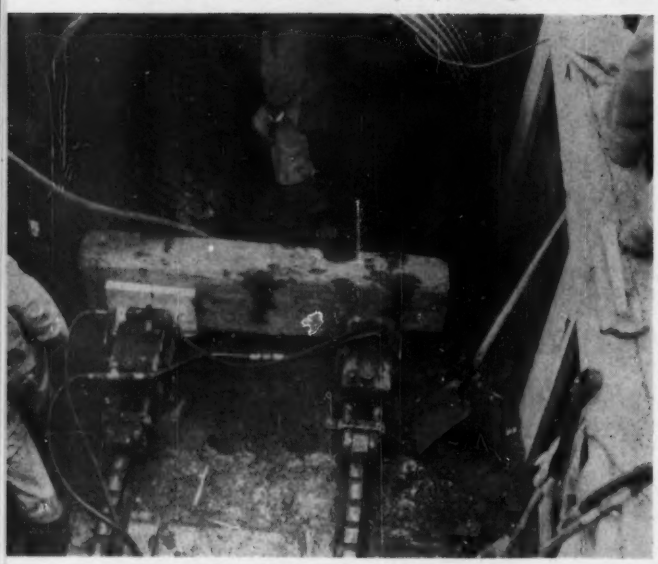
How IP&L Crossed R.R. with Long Duct

Hydraulic jacking of corrugated steel pipe is lowest-cost means of putting in 110-ft line

YALE GOLDBERG, Supervisor Engineer, Underground Lines, and **GLENN F. WALKUP**, Engineer, Iowa Power & Light Co, Des Moines, Iowa



PIPE SECTIONS in 10-ft and 12-ft lengths were made at the factory by riveting together 2-ft lengths. The pipe was coated with a bitumastic as protection against corrosion



HYDRAULIC JACKS pushed the pipe forward as a tunnel was being dug in front of it. Procedure was to remove earth from in front of the pipe, then push the pipe ahead

METAL SHIELD bolted to pipe section eased the jacking operation by keeping dirt from dropping into corrugations

To install a 110-ft duct line beneath the main-line tracks of three railroads, Iowa Power & Light Co considered several alternate methods of construction:

1. Regular bridge shoring and cribbing.
2. Supporting existing rails by additional parallel rails, a method used on similar projects.
3. Jacking bitumastic-covered corrugated steel pipe under the tracks and then laying the duct line through the pipe.

The third method proved to be the most economical. Also, it had the approval of the three railroads because it permitted railway traffic to proceed at normal speeds. The duct line consisted of two banks of twelve 4-in. fiber ducts for power cables and two 2-in. fiber ducts for control cables.

To house this line a 6-ft-dia corrugated steel pipe was selected. The pipe was available in 10-ft and 12-ft lengths made by riveting together 2-ft lengths at the factory. With sufficient space between some of the tracks for an open-sheathed well, it was feasible to install the pipe in two sections. The north section was 58 ft 4 in. long; the south section, 52 ft 6 in. The open-sheathed well kept the earth from giving way next to the tracks.

Prior to jacking in the pipe, a piece of sheet metal was bolted over the top of the front end of the first pipe length. This hood eased the pushing operation by keeping earth out of the corrugations on the top of the pipe. Before pipe sections were jacked forward, earth was removed from in front of the pipe for a short distance; then the pipe was pushed forward this distance and the operation repeated. Thus the pipe was not pushed against an earth wall. The only force required was that needed to move the weight of the pipe.

After both sections were in, a 14-in. concrete floor was poured. The two 14-duct banks then were laid, using base and intermediate spacers, and enclosed in a concrete envelope. Pipe sections were welded together to make them electrically continuous and were connected to magnesium electrodes to prevent electrolytic corrosion. To guard against settling of the track bed should the pipe corrode in spite of being protected, sand was packed around the duct banks to fill the pipe.

As part of the same job, a 3-ft dia pipe was jacked hydraulically 38 ft under the tracks. Because of the shorter length and diameter, it was possible to push one length of pipe the entire distance. This pipe houses a single bank of 12 power ducts and two control ducts. Space in the pipe surrounding the bank was filled with concrete to prevent settling should the pipe corrode.

ELECTRIC DRIVES FOR THE ELECTRIC INDUSTRY

At Muskegon, Michigan . . .

G-E Boiler Feed Pump Motors Minimize Noise in Consumers Power Company Station

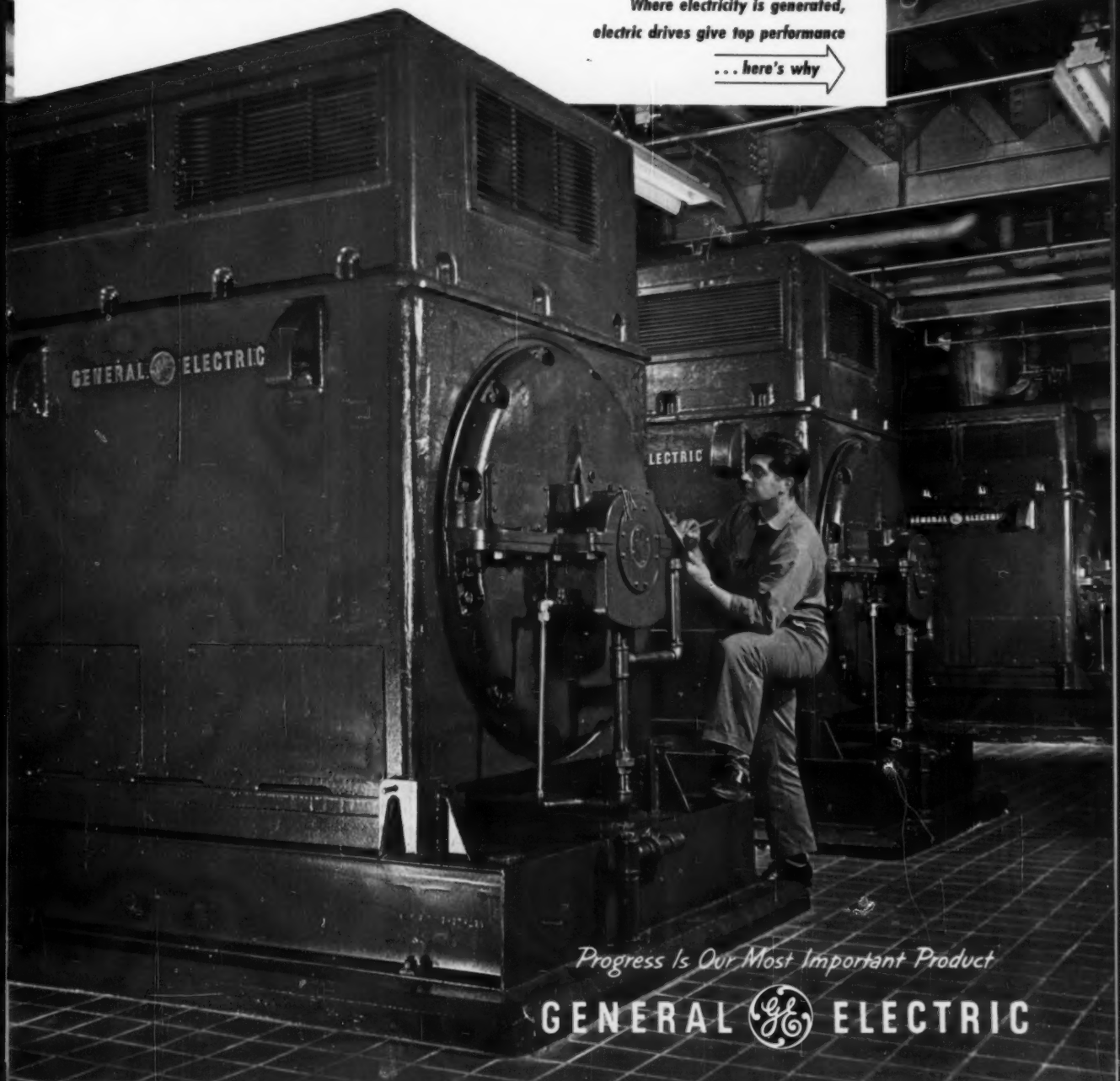
To help meet peak industrial load demands in Western Michigan, Consumers Power Company recently added a fifth generating unit to their B.C. Cobb station in Muskegon. This General Electric-equipped unit utilizes three new, 2500-hp G-E Boiler Feed Pump Motors to give the B.C. Cobb station a 510,000 kilowatt capacity—largest on the Consumers Power System.

According to Mr. E. J. Palmer, plant superintendent, the acoustic treatment of the new motors "certainly makes it easier on the operators." The G-E motors feature a unique, acoustically-treated top section which has all but eliminated uncomfortable, high-speed motor "whine."

Other features of these motors include a new pressure-sealed bearing system and new materials and manufacturing techniques which have added years of life and reduced motor maintenance.

As a result, G-E Boiler Feed Pump Motors provide the quiet, efficient, low-maintenance operation demanded of modern power-station auxiliaries.

Where electricity is generated, electric drives give top performance . . . here's why

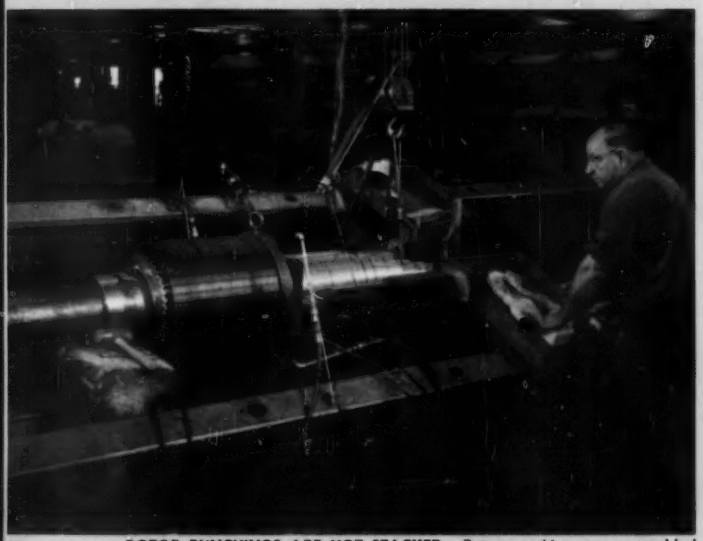


Progress Is Our Most Important Product

GENERAL ELECTRIC

ELECTRIC DRIVES FOR THE ELECTRIC INDUSTRY

New rotor manufacturing techniques improve G-E Boiler Feed Pump Motor performance

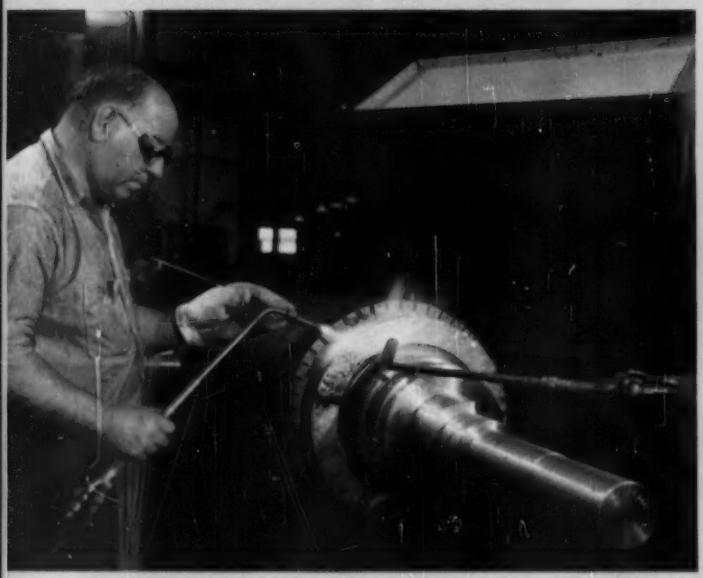


ROTOR PUNCHINGS ARE HOT STACKED—Rotor punchings are assembled in small packages, heated in an oven for several hours, stacked on heavy steel shaft and cooled to room temperature at over 100-tons force. Punchings remain perpendicular to shaft, eliminating "punching migration."

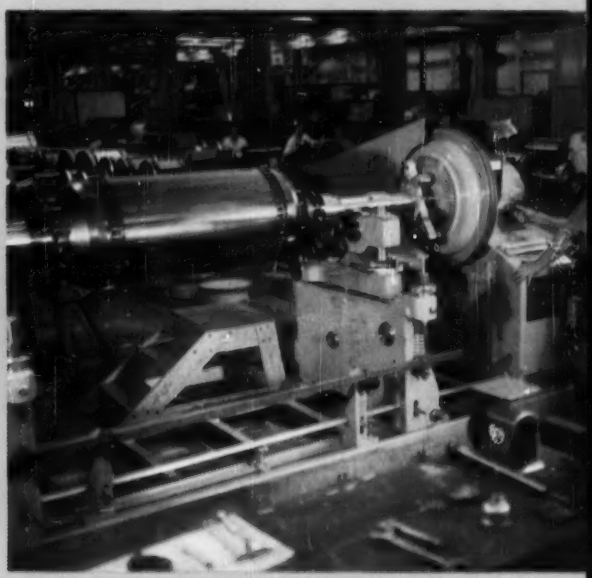
To improve motor efficiency, lower maintenance costs and reduce the noise level, General Electric engineers have developed new manufacturing techniques and better materials for the precision-made rotors of G-E Boiler Feed Pump Motors. Coupled with rigid quality-control tests, these techniques and materials mean significant improvements in rotor performance. For example:

- Precision-machined shaft journals are given a final, high-polish finish to reduce bearing losses and increase bearing life.
- Solid copper end rings, forged from heavier gage stock than used for conventional rotors, provide greater rotor stability. Milled end ring grooves give proper mechanical rotor bar fit.
- Non-magnetic steel retaining rings, supported from the shaft, are fitted over the *entire* end ring assembly to limit stress build-up in end ring and rotor bar connections during motor operation.

Careful attention to every detail of rotor construction is just one more reason why General Electric Boiler Feed Pump Motors operate more reliably, more efficiently and with less attention. For complete information on General Electric's new Boiler Feed Pump Motor, contact your nearest G-E Apparatus Sales Office or write section 882-6, Medium AC Motor and Generator Department, General Electric Company, Schenectady 5, New York.



ROTOR BARS AND END RINGS ARE SILVER-BRAZED—Solid copper bars are driven through stacked punchings and held firmly in place by copper end rings. Bars and end rings are joined by silver brazing to help provide a virtually indestructible rotor with minimum electrical resistance.

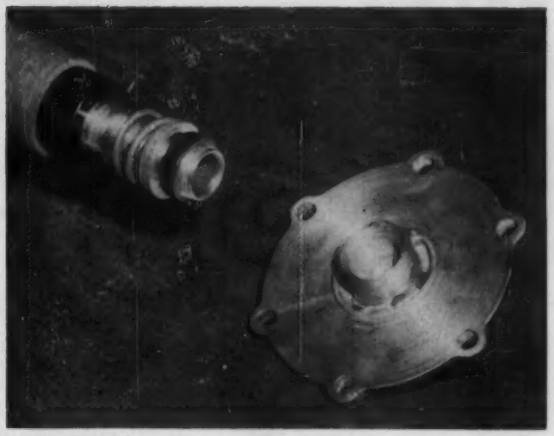


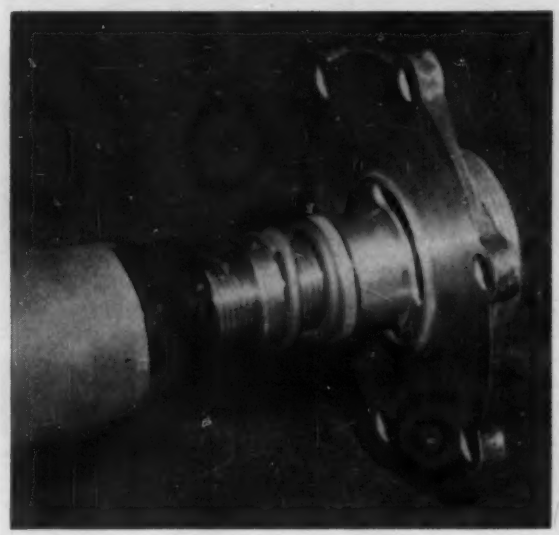
COMPLETED ROTORS ARE DYNAMICALLY BALANCED—Specially designed General Electric machines test each completed rotor for smooth, quiet, vibration-free operation. Machine balance is later verified when rotors are checked again, assembled in their own bearings.

Progress Is Our Most Important Product

GENERAL ELECTRIC

33-Kv Bushing Modernization Modified





FIRST STEP (above) in attaching the top cap to the core is to screw the "jam nut" so as to compress the spring 3/8 in. This compresses the core-seal gasket and seals the threads. SECOND STEP (right) is to put on the cap and other parts

JAMES H. CRAVENS, Indiana & Michigan Electric Co, Marion, Ind.

The standard procedure for modernizing certain old bushings involves one objectionable requirement: The soldering of the top cap to the threads of the core to seal the bushing after it is assembled. The intense heat of soldering may damage the gasket and/or procelain shell, and the soldered joint hampers future repairs.

These objections have been eliminated by the modified procedure illustrated. When assembling a bushing modernized in this way, the lengths of the porcelain and core down to the ground sleeve must be measured. The "jam nut" is then screwed on the core and adjusted so that the core-seal spring is compressed 3/8-in. to compress the core-seal gasket and properly seal the threads of the bushing. The modified cap is then installed with the other parts.

The parts involved in this modified modernization procedure are inexpensive, save time in rebuilding, and avoid damage to gaskets and porcelain or resulting leakage and flashover.

MANAGEMENT—Purchasing

Snow-Mud Tires Cut Operating Costs

J. L. PECK, Toledo Edison Co, Toledo, Ohio

Toledo Edison Co's winterizing of passenger cars and light commercial trucks discards the use of chains and provides for the quick and economical mounting of snow tires. The use of snow-mud tires, along with driver training to make such tires effective, has allowed the company to maintain schedules despite bad weather and has saved the company thousands of dollars in labor and material.

Provision for winter begins at the purchasing stage. For its passenger cars and light commercial units, the company purchases an additional wheel and snow-mud tire besides the regularly carried snow-mud spare combination. Thus the company has on hand six wheels and tires per car.

Throughout the more clement months, each vehicle carries a spare combination, while the second wheel and snow-mud tire, properly labeled, remains in storage. At winter's beginning, the two mounted snow-mud tires are put on the vehicle's rear wheels in a few minutes. One of the highway type combinations of tire and wheel is placed inside the car as a spare for the winter, and the other highway type goes into storage until spring. The winter combination is mounted in a minimum time and at a minimum of labor cost.

With improved designs of snow-mud tires for passenger cars, use of chains during the winter months is eliminated in most cases.

1. FULL LINES OF LUMINAIRES

2. FULL CONTROL LINE

Four reasons to specify General Electric

When you place your street lighting business with General Electric, you buy more than quality products alone. You get a complete package of products AND service backed by engineering skills and research findings. You get benefits which have come about through years of experience in serving the public lighting needs of the nation.

Specifically, here's what you can draw on when you work with General Electric in developing a ***vision-engineered system*** for best lighting of your streets:

1. FULL LINES OF LUMINAIRES

Whatever the application—whiteway, main street, primary or secondary traffic artery, residential street, highway, bridge, viaduct, underpass—you can choose from ***all three*** light source types: filament, mercury, and fluorescent. Only General Electric offers you full lines of all three!

Since G.E. offers complete selection, you know we have no "axe to grind" in recommending one luminaire type over another. The advice you get will be impartially based on the engineering and economic facts for your particular situation.

2. FULL CONTROL LINE

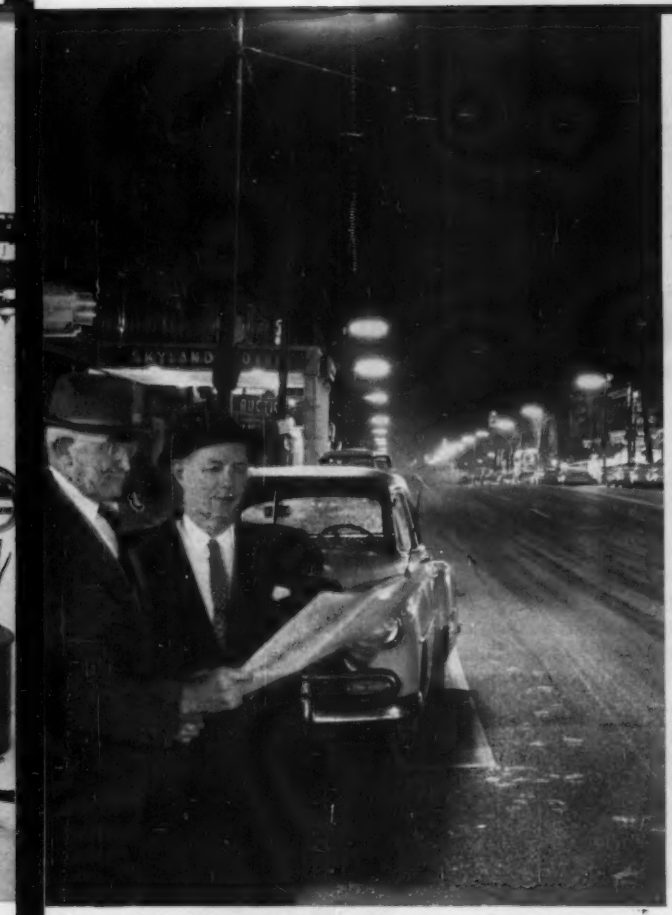
General Electric's full line of circuit equipment will integrate your street lighting into a dependable, efficient system, no matter what the situation may be!

For every combination of factors affecting control and protection—type of light source used, circuitry, wiring, etc.—a different solution is required. Experienced General Electric lighting specialists will utilize proved equipment to develop a control system exactly suited to your needs.

3. START-TO-FINISH APPLICATION HELP

Initial survey, preliminary application investigation, action recommendation, complete Illuminating Engineering Report for your staff or consultants . . . these services are included in the application aid "package" at your disposal when you place your street lighting business with General Electric!

Experienced General Electric outdoor lighting specialists are located in every major city. Backing these field specialists are more career lighting men at the Hendersonville, N. C., plant. The talents of both groups are available to you at all times.



3. START-TO-FINISH APPLICATION HELP

4. RESEARCH LEADERSHIP

vision-engineered street lighting systems

Benefit from the years of street lighting experience General Electric has gained since Thomas Edison lighted the street in front of his home in 1879! Put this know-how to work devising the best means to bring greater visibility to your city's streets!

4. RESEARCH LEADERSHIP

At General Electric's "Outdoor Lighting Center of the World" in Hendersonville are located the industry's newest and most complete laboratory, development, and proving facilities.

These facilities are being used on present, as well as future, problems. For example, a fully equipped photometric laboratory assures you precise accuracy of light output measurements and distribution curves for all types of equipment. Another example: four full-sized demonstration streets provide an authentic means for application experiments involving many different street lighting variables.

Moreover, special tests are run for customers, at their request, by a trained, professional engineering staff wholly devoted to ever-greater advances in the art and science of public lighting.

INVESTIGATE NOW!

Let your Apparatus Sales representative or authorized agent help you get the optimum amount of *vision* from an integrated *system* which is *engineered* to your particular street lighting situation! General Electric Co., Schenectady, N. Y.

452-172

LIVE BETTER ELECTRICALLY

VISION-ENGINEERED STREET LIGHTING SYSTEMS

GENERAL ELECTRIC

Fire Prevention Guide on Construction Jobs

Accompanying check-list is an aid for fire prevention and protection. This list is adapted from a safety bulletin issued to construction project personnel of Stone & Webster Engineering Corp.

Good housekeeping and good maintenance are considered fundamental for preventing fires and protecting property on construction jobs in the power, chemical, petroleum, nuclear facility and other industrial fields.

On all jobs, the superintendent of construction is responsible for maintaining a continuing program for safeguarding all property connected with the work.

A check list is used by job safety committees charged with safeguarding materials, machinery, equipment, permanent and temporary buildings and their contents.

A safety bulletin issued to construction personnel includes four specific points introductory to the check list.

"Fire prevention and protection necessarily must keep pace with the construction program.

"Immediate correction of any hazardous condition is essential to avoid delay in our construction work and to prevent financial loss to our client and to ourselves.

"Concentration of values in confined or hazardous areas or in closely grouped buildings must be avoided when possible. There should be no delay in installing fire protection equipment. Adequate protection must be provided as soon as combustible material, temporary building and contents are on the construction site.

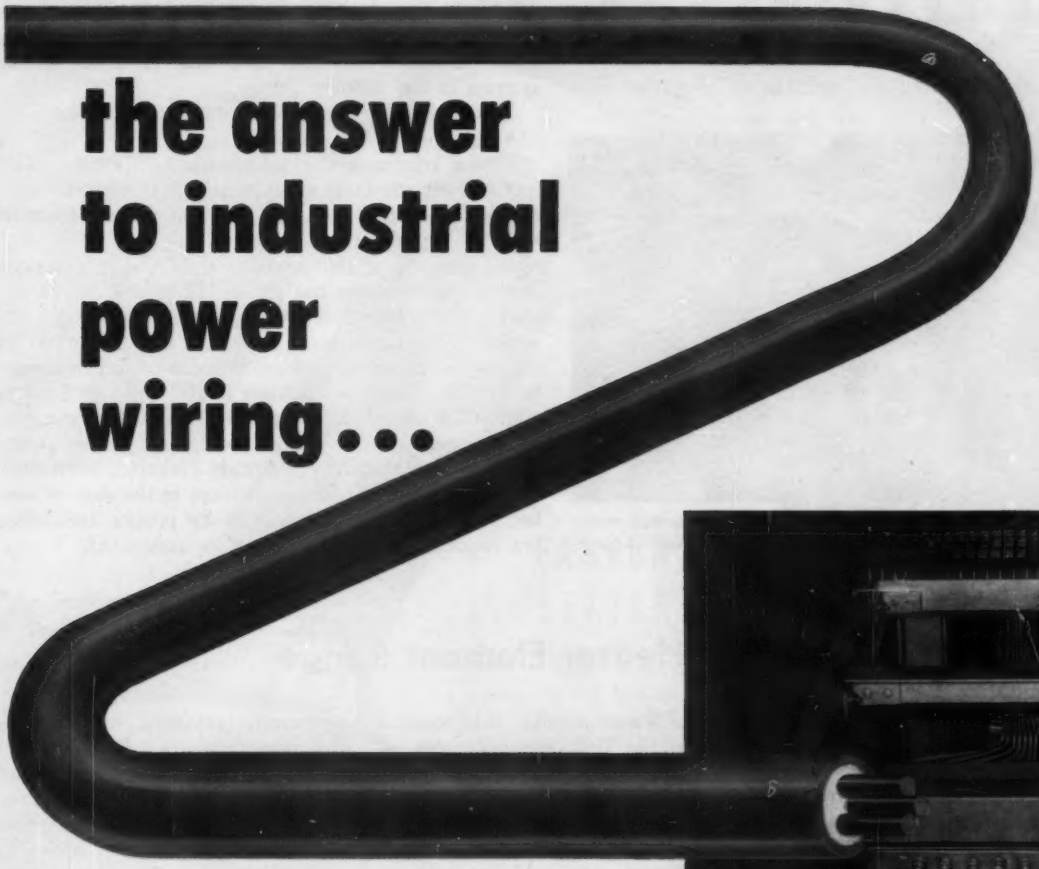
"Location of fire-alarm boxes, fire-fighting equipment, such as extinguishers, water barrels, pails, hand-pump extinguishers, etc., hose, hydrants and valves should be located and marked conspicuously, and immediately available and protected against freezing or other damage."

Itemized Check-List for Fire Prevention and Protection

1. **Electrical Equipment**
   - Switches
   - Insulation
   - Fuses
   - Grounding
2. **Matches or Smoking**
   - Confined to places permitted
   - Safety matches, only, used
3. **Heat Hazards**
   - No combustible material in contact with steam pipes, furnaces, flues, etc.
   - Ashes in metal containers
   - Care and maintenance of salamanders and their location to tarpaulins, which must be fireproofed, and combustible materials
   - Protection of combustible materials, and fire prevention in connection with welding and burning operations
4. **Flammable Liquids**
   - Handling and use
   - Stored in approved place
   - Safety cans used
   - Tanks, drums and cans in good order
   - No leaks
5. **Oil and Paints**
   - Stores in approved place
   - No leaks
   - Drippings properly disposed of
6. **Combustible Materials**
   - Stored in approved bins or containers
7. **Oily Rags and Waste**
   - All in approved metal receptacles
   - Disposed of regularly
8. **Gas (including Oxygen and Acetylene)**
   - No leaks
   - Turned off when not in use
9. **Refuse**
   - In approved containers
   - Disposed of daily
10. **Lockers and Closets**
    - Kept neat
    - No accumulation of rubbish
11. **Temporary Buildings and Contents**
    - Housekeeping in and around building
    - Ample spacing between buildings to prevent fire communicating
    - Storage of material and equipment
    - Availability of fire fighting equipment
12. **Fire Fighting Equipment**
    - In place
    - Easily accessible
    - In working order
    - Sprinkler valves open
    - Sprinkler heads unobstructed
    - Alarms in working order
    - Checked and tested frequently

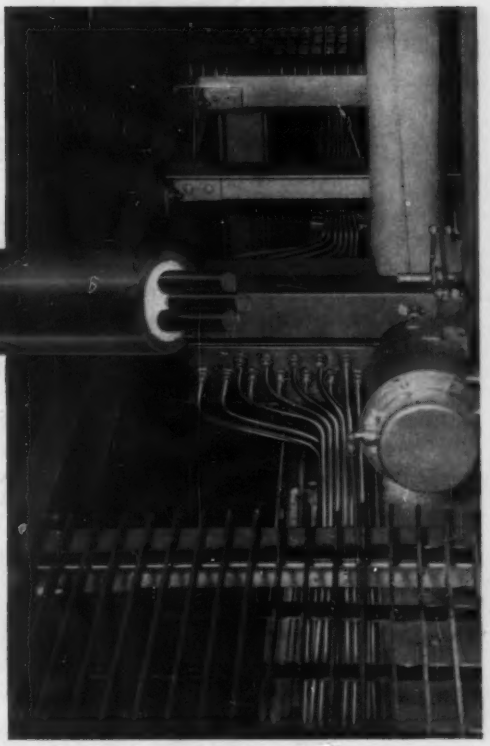
SAFETY m.i. CABLE

the answer to industrial power wiring...



- **SPACE SAVING**
- **Time saving**
- **Permanent**
- **INSTALLED EASILY**
- **Fast power wiring to cut down-time**

More and more General Cable's Safety MI 600 Volt Wiring System is being used because it can take the abuse of industrial application, giving trouble-free operation and unexcelled performance under the most severe conditions. Particularly adaptable in hot and wet locations. Available in 1, 2, 3, 4 and 7 conductor for power and control circuits.



MI terminating in main Japan Oven control center switchboard at Poinsett Lumber and Manufacturing Company, Anderson, S.C.

Ask for a Demonstration To-Day!

GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, N. Y.

Offices and Distributing Centers Coast-to-Coast

for quality and service... **specify GENERAL CABLE**

Duquesne Unveils Customer Service Center

Duquesne Light Co, Pittsburgh, Pa., recently took the wraps off its completely modern centralized customer service center.

Designed to speed the handling of telephone calls for service and the flow of information to its customers, the new center has an IBM-punch card backbone that makes it one of the most up-to-date customer service systems in the country.

SPECIALLY DESIGNED MOVING CHAIR allows service center employee to go from file to file filling customer requests

Specially trained employees man the center to:

- Take orders for electric service.
- Give information about electric appliances.
- Answer questions about electric bills, credits, meter reading, and other company business matters from its 412,000 residential customers.

As a result of the installation of the new service center, the company has set up 12 new locations for paying bills, and closed three district offices.

Here's an example of what the center can do in the way of customer service: When a customer moves, he calls the center and advises the company of his new address. Changes in billing are automatically made. Arrangements are made for power and service at the new address if they are not already available. No further customer action is necessary except in the case of new homes, where wiring approvals by proper authorities are required before service can be connected.

AG&E Broadens Water Heater Element Range

American Gas & Electric Co recently put into effect a broad liberalization of heater element wattage specifications for 40, 50 and 80-gal water heaters, according to a recent issue of Ohio Power Review.

The change in acceptable wattage sizes follows close on the heels of an announcement by a special study group of ten water heater models chosen as a step toward standardization (EW, Sept. 30, 1957, p 49). This group, made up of utility execs and manufacturers, was headed by AG&E's Paul Brooks. It is believed to be the first announcement of a change in water heater policy related to the group's findings.

New wattage maximums include the 4,500-w rating in both the upper and lower element in the 40-gal sizes; a 2,000-4,500-w rating in the 50-gal sizes; and a 3,000-4,500-w rating in the 80-gal heaters.

In a letter to water heater sales outlets, Ohio Power said:

"The 40-gal 'quick recovery' water heater offers advantages to customers, retailers, distributors, and manufacturers. For the customer it delivers more 150F hot water and does it faster than ever before. It supplies hot water as fast as needed for household use.

"Being small in size, it can be installed in utility rooms, kitchens, closets, and other convenient places. For retail outlets, distributors and manufacturers, this one heater takes the place of several sizes and models. It simplifies ordering and stocking and reduces inventory."

Gals Get Ready For Their Second LBE Conference

Some 300 women with career interests in the home field will gather for the second annual Live Better Electrically Women's Conference in Chicago, Jan. 9-11.

The theme of this year's confab is "How to Tell the Story of Electrical Living." Directed primarily to utility home service women, it will be developed in talks on communications and presentation techniques. The use of various mass media (radio, TV, newspapers, magazines, etc.) will be covered extensively. Slides, films and other demonstrations are on the agenda.

Interests compatible with the residential electric field, i.e., canned and frozen foods, soaps and detergents, will also be represented. Speakers include a variety of leading authorities in these related home fields.

Reservations: Judith O'Flaherty, Philadelphia Electric Co, 211 South Broad Street, Philadelphia, Pa.

(*More Selling on page* 78)

IT'S FASTER WITH FARGO!

FARGO COMPRESSION CONNECTORS

FASTER! BETTER! SAFER!

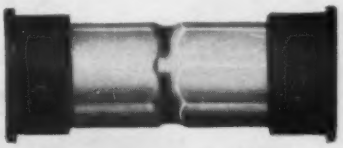
Faster? You bet! Fargo Service Compression Connectors fit right . . . work right . . . are precision made. Solid center wall automatically measures conductor to be inserted. Exclusive octagonal shape requires less effort to compress.

Better? Yes sir! They're longer . . . they have uniform mechanical and electrical characteristics . . . their solid barrier eliminates galvanic corrosion between dissimilar conductors . . . they're filled with Fargolene, an oxide inhibitor.

Safer? Absolutely! Extra length allows for easier handling . . . space for three compressions on a side . . . installed easily with Fargo's lightweight "one-hand" tool.

Everything about the Fargo compression connector is better. Check and compare.

ASK YOUR LINE MATERIAL FIELD ENGINEER FOR COMPLETE DETAILS.

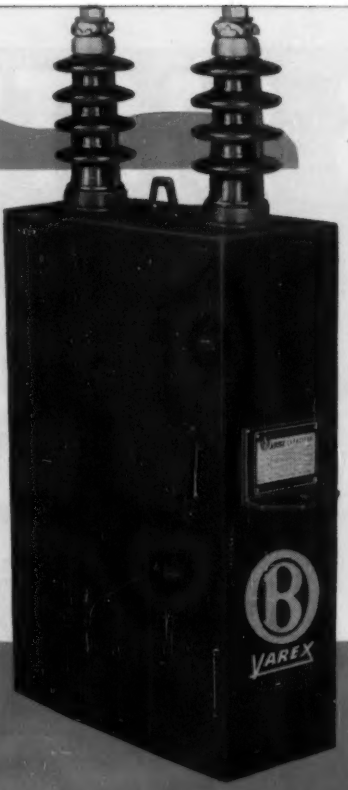


Fargo aluminum color coded compression connectors are available in two sizes . . . 1/2", 12E Series, for conductors from #8 solid through #2 ACSR . . . 5/8", 58E Series, for conductors from #8 solid through 1/0 ACSR.

Distributed by
LINE MATERIAL INDUSTRIES
(A McGraw-Edison Company)
Milwaukee, Wisconsin

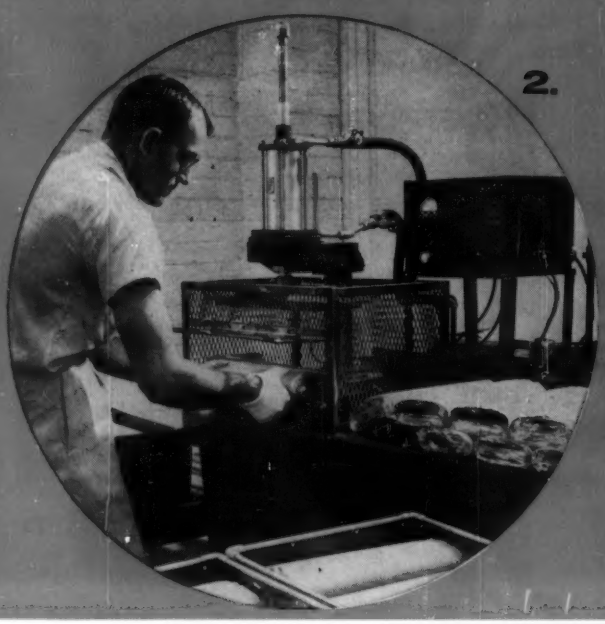
Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie
New York

FARGO



1.

3.



2.

1. Since there is no need to interrupt winding operation to insert contact tabs, the active dielectric in Varex elements is never touched, not even by gloved hands. The winding room is air conditioned.

2. Every element is checked electrically with DC voltage to insure freedom from shorts or other faults.

3. When elements, secondary insulation and other internal parts are handled, the hands always wear white gloves.

4. White-gloved hands guide the pack assembly into the metal case. The best protection against impurities is to keep them out in the first place.

5. Varex capacitors are dried by carefully controlled combination of heat and vacuum that evacuates them to the low micron range.

PURITY...

VAREX CAPACITORS

GET THE WHITE-GLOVE TREATMENT

PURITY is a way of life in the Varex capacitor plant. Everything that goes into Varex gets the white-glove treatment, figuratively and literally, since one of the best ways to guard against capacitor failure is to use pure materials and to keep them uncontaminated during manufacture.

Incoming insulating paper, aluminum foil and askarel—the real insides of a capacitor—get a complete series of tests to confirm their physical, chemical and electrical characteristics and check their purity. The askarel is again purified and degasified just prior to use, right in the O-B capacitor plant.

Provisions for purity are inherent in the Varex design. For example, the method of cooling elements, with a foil extended at either edge also contributes to the elements' freedom from contamination. It means there need be no interruption of the winding process to insert contact tabs in the element. As a result, the active dielectric is never touched, not even by a white-gloved hand! Winding is done in an air-conditioned room. When the outside of the element, the secondary insulation and other internal Varex components are handled, the hands always wear white gloves.

Before the askarel impregnant goes into the capacitor, the unit is thoroughly and rigorously vacuum-dried to a low micron range, to remove gases and moisture.

As a final safeguard, a power factor measurement is made with the unit operating at full-rated 60-cycle voltage. But we believe the best protection against impurities is to keep them out in the first place. That's why Varex capacitors get the white-glove treatment!

Ohio Brass

4.

5.

Carrier Sees 4% A.C. Sales Jump in '58

Carrier Corp chairman Cloud Wampler predicted a 4% gain in air conditioning equipment sales next year. Wampler made his predictions at the opening of a new Carrier plant in Southern California recently.

He forecast that industry retail volume in 1958 will hit $3.4 billion. This is about $133 million above the estimated 1957 level. By 1962 he sees sales of more than $5 billion.

The modest 4% jump points to a slowdown in air conditioner sales. What are the reasons? Among others, according to Wampler, they are:

- Reduced housing starts.
- Excess capacity in many plants.
- Tight money.
- Unfavorable weather in some market areas.

Profits are down, too. The Carrier exec sees no let up in this situation in '58. Competition, if anything, will get more intense.

Wampler hit also at excessive distribution costs, saying "I don't think it makes any sense for the consumer to have to pay as much for goods as three times the cost of manufacture. In the last 20 years of American business, scant attention has been paid to the cost of distribution."

H & C BRIEFS

Hoosier Heat for '58

Public Service Co of Indiana is developing plans for promoting electric heat in 1958. IPS now has some 170 electric heating customers, 10% of which have heat pumps.

Worthington Shifts A.C. Control

All Worthington Corp's home air conditioning and heating equipment sales will be handled by the company's Mueller Climatrol Division under a new policy announced by president W. H. Feldmann. Sales to commercial and industrial markets will continue to be handled by the Air Conditioning and Refrigeration Division.

TP&L's 3R's for Electric Heat

In order to boost the number of employees trained in electric heating (especially heat pumps), Texas Power & Light is planning a one-week course on the subject. Scheduled to begin Feb. 8, it is set up to handle 60 people.

Employees Talk it up at AP&L

Employees are "talking it up" about Arkansas Power & Light's new electric heating promotion (EW, July 29, 1957, p 73). Interest is mushrooming among employees and customers, according to a report in the company's house organ.

A.C. in New Alcoa Homes

General Electric Co announced that its year round air conditioning is being featured in 25 Aluminum Co of America "Care Free" homes being shown around the country. Year round air conditioning is being demanded by the public as one of the requisites of good living, according to C. M. Goodman, architect for the Alcoa homes. Heating and cooling is achieved by dispersing the air along the floor sill of large sliding glass doors which comprise 25% of the wall area.

N. Y. Heating Sales Spurt

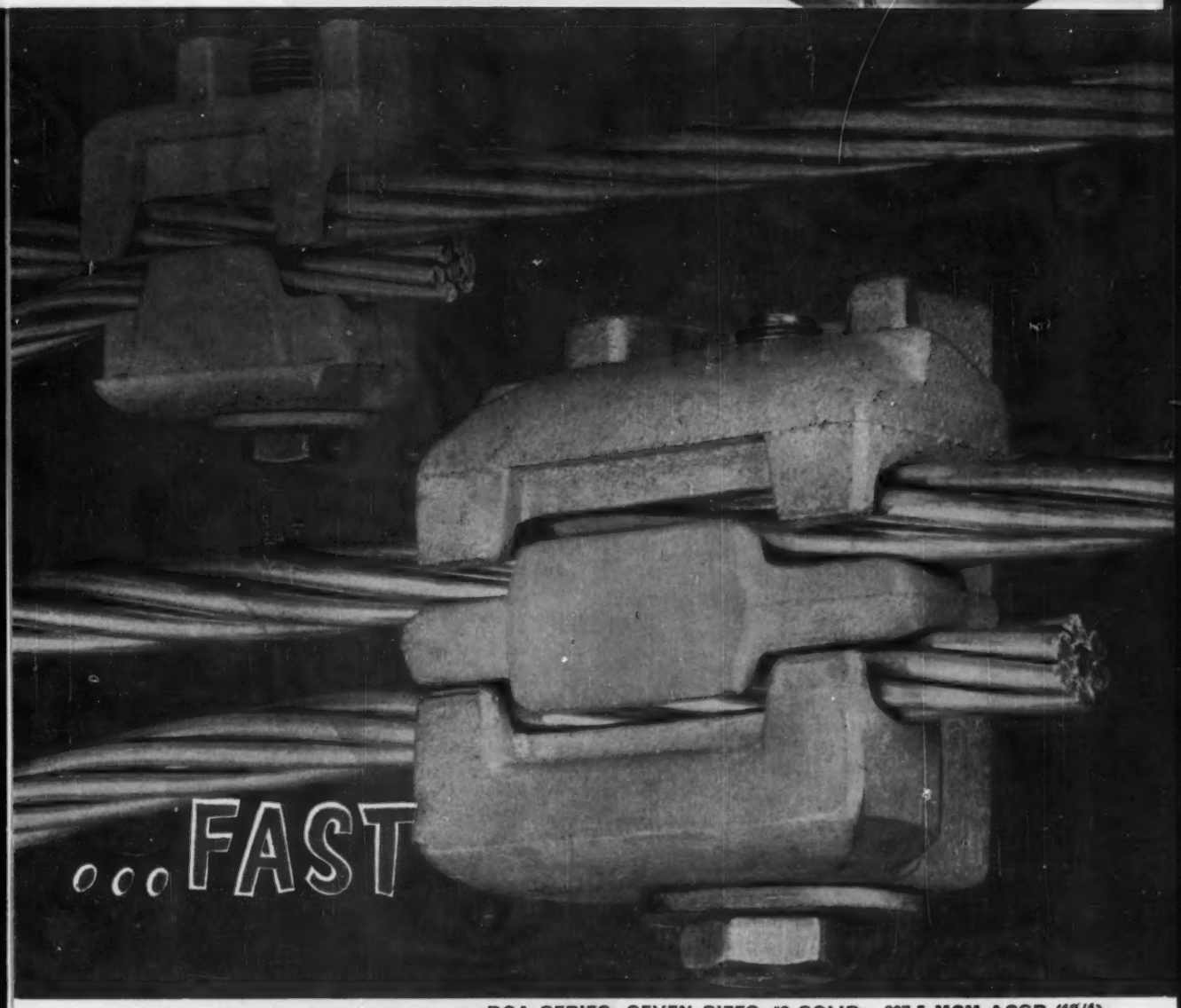
Niagara Mohawk Power Co is chaulking up healthy residential electric heating sales the last few months. Six hundred customers are now on the line in western N. Y. state. The campaign of a Rochester heating unit manufacturer has spurred customer interest in some communities.

(*More Selling on page* 80)

DGD Bolted Dead-End Clamp

The DGD Bolted Distribution Dead-End is specially designed for light duty pole and house service drops. Eleven inch bale is compressed into the body of the clamp which includes a "wave seat" to provide added holding power. One piece clamp design assures quick, easy installation. Cable sizes from #8–1/0ACSR.

ANDERSON ELECTRIC CORPORATION
Birmingham 1, Alabama
Export Representative: International Standard Electric Corp.



DGA SERIES: SEVEN SIZES: #8 SOLID—397.5 MCM ACSR (18/1)

One Piece Construction: Makes for fast installation. Just hook on the Main, insert Tap and tighten!

High Conductivity Spacer: Anderson's soft, pure, aluminum Cover-All Spacer assures additional contact with individual strands. Spacer design material and massive construction combine to provide cool running, long-life contacts.

Extended Spacer for Easy Application: Whether applying the DGA on "hot" or "dead," the Spacer can easily be picked up for Tap insertion.

Positive Interlocked Upper and Lower Grooves: Main and Tap groove alignment is maintained by interlocked casting bodies, thus aiding installation and improving contact efficiency.

Pre-Inhibited: All DGA connectors with spacers are chemically cleaned and inhibited at the factory. Contact resistance is greatly reduced and maintained by Anderson's exclusive inhibitor coating process. Gives corrosion protection without surface greasiness or tackiness.

Kleen-Seel: At slightly additional cost all DGA connectors will be delivered with grooves inhibitor-packed and the connectors sealed in polyethylene bags.

ANDERSON ELECTRIC CORPORATION
Birmingham 1, Alabama

Export Representative: International Standard Electric Corp.

ANDERSON ELECTRIC

Research / Quality / Performance / in Aluminum and Bronze Products

luminum and Bronze Power Connectors • Clamps • Fittings • Accessories for SUBSTATION • TRANSMISSION • DISTRIBUTION

Mechanized Handling Trims Plant Labor Cost

W. F. HUTCHINS, Power Sales Engineer, West Penn Power Co, Ridgeway, Pa.

An automated conveyor system, installed at the Sylvania Electric Co plant in St Marys, Pa., has speeded up lamp production, cut labor costs, and permitted a more efficient production area layout. With the new system, a case of lamps takes only about one hour to make the trip from the lamp assembly machines, through the inspection stations and the sealing machines, to the shipping area.

Loaded on siding by area lifts, cases . . .

Sixteen conveyor sidings, one for each lamp assembly machine, feed the main conveyor. At each machine, the workers pack the lamps in a case placed on a waist-high platform of a vertical lift. When the case is full, a manually-started motor raises it to the conveyor siding.

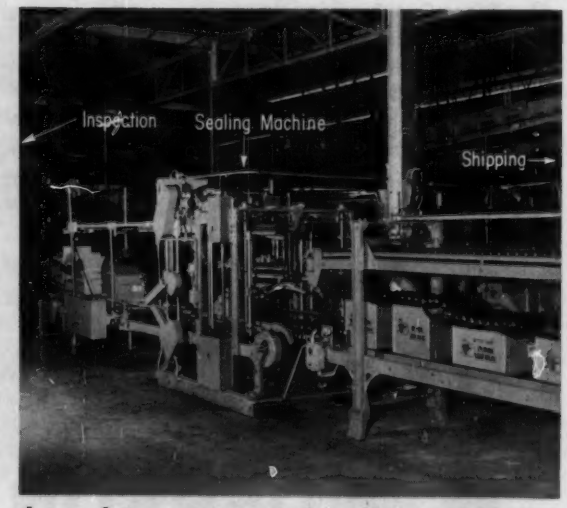
Cases move to the main conveyor automatically. A timing motor activates the 1/10-hp synchronous motor and cam at each of the 16 sidings in rotation. The sidings are emptied at the rate of one every 90 seconds. Clearing the main conveyor takes another six minutes, making a total of 30 minutes for each complete operation. The cycle then starts all over again. The main conveyor is driven by 12 two-hp motors.

Conveyor Uses No Floor Space

The main conveyor divides into two legs to carry cases through the two inspection stations. The two legs merge again at the sealing machine. Here an indexing device measures the height and width of each case and adjusts and activates the rods, arms, and rollers which close, glue, and fold the side and end flaps. An endless roller then applies pressure on the top of the cases, moving to the shipping room, until the glue sets.

The conveyor uses only off-the-floor space, permits more productive use of floor, keeps case handling costs low, and makes for smoother and more continuous flow of lamps.

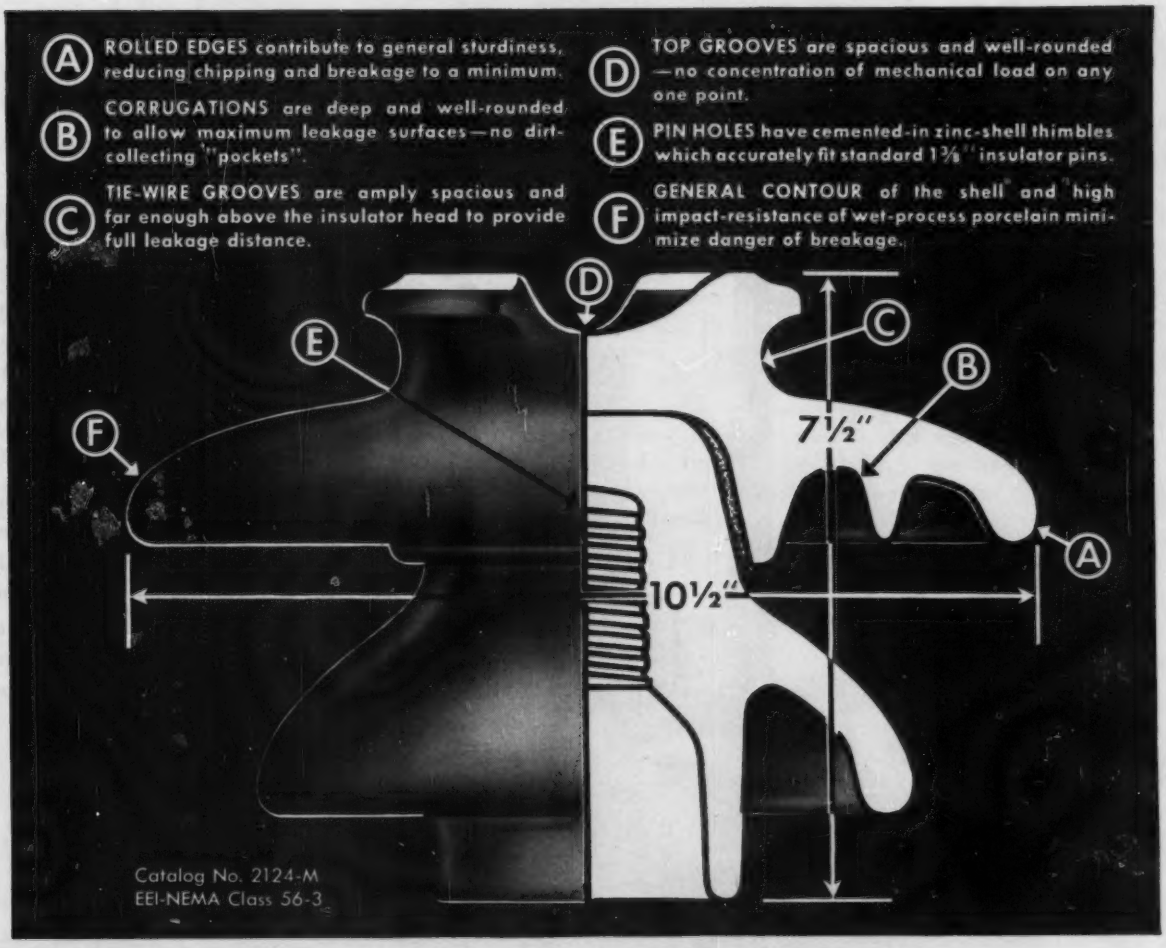
are fed to main conveyor, then . . .



through inspection and sealing to shipping

Thomas high-voltage pin-type insulators—quality-built for top performance

CHECK THESE FEATURES


A ROLLED EDGES contribute to general sturdiness, reducing chipping and breakage to a minimum.
B CORRUGATIONS are deep and well-rounded to allow maximum leakage surfaces—no dirt-collecting "pockets".
C TIE-WIRE GROOVES are amply spacious and far enough above the insulator head to provide full leakage distance.
D TOP GROOVES are spacious and well-rounded—no concentration of mechanical load on any one point.
E PIN HOLES have cemented-in zinc-shell thimbles which accurately fit standard 1⅜" insulator pins.
F GENERAL CONTOUR of the shell and high impact-resistance of wet-process porcelain minimize danger of breakage.
7½"
10½"
Catalog No. 2124-M
EEI-NEMA Class 56-3

Shown here is one of the Class 56 of EEI-NEMA high-voltage pin-type insulators made by Thomas Works.

Especially recommended for transmission applications, these insulators embody all the tested and proven refinements of design and construction that assure long service life and superior performance under severest operating conditions.

An added feature: All five Thomas EEI-NEMA High-Voltage Pin-Type Insulators are also available with Thomas "QT" (Quiet-Type) radio treatment at no extra cost.

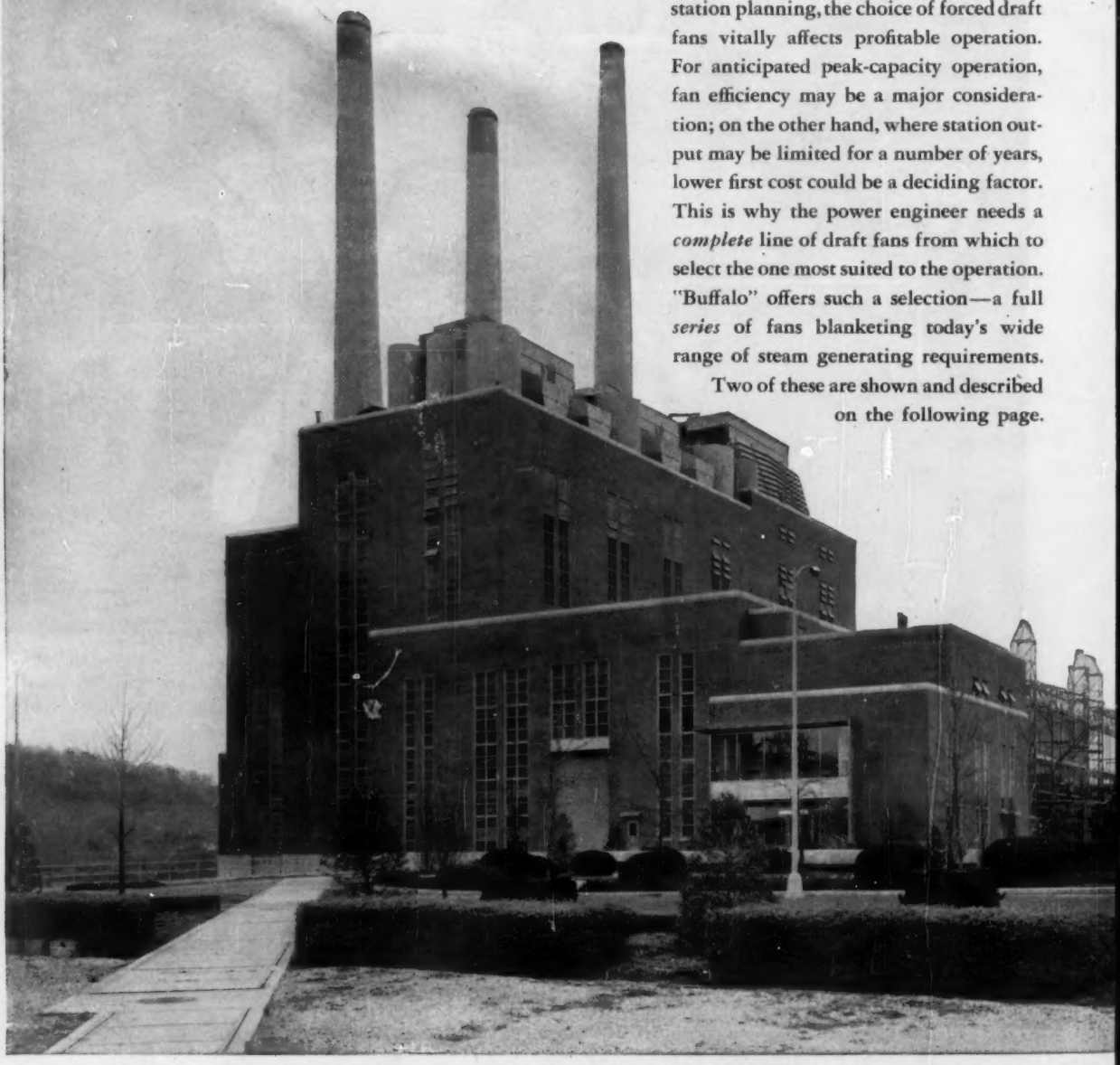
Physical ruggedness and optimum electrical properties are obvious characteristics of Thomas High-Voltage Pin-Type Insulators. For full information, write *Thomas Works, Delta-Star Electric Division, H. K. Porter Company, Inc., Lisbon, Ohio. Offices in principal cities.*

H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION

Porter Divisions: Cleveland, Connors Steel, Delta-Star Electric, Henry Disston, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, W-S Fittings, H. K. Porter Company (Canada) Ltd.

WHERE HORSEPOWER IS EVALUATED



Where horsepower is evaluated in power station planning, the choice of forced draft fans vitally affects profitable operation. For anticipated peak-capacity operation, fan efficiency may be a major consideration; on the other hand, where station output may be limited for a number of years, lower first cost could be a deciding factor. This is why the power engineer needs a *complete* line of draft fans from which to select the one most suited to the operation. "Buffalo" offers such a selection—a full *series* of fans blanketing today's wide range of steam generating requirements.

Two of these are shown and described on the following page.

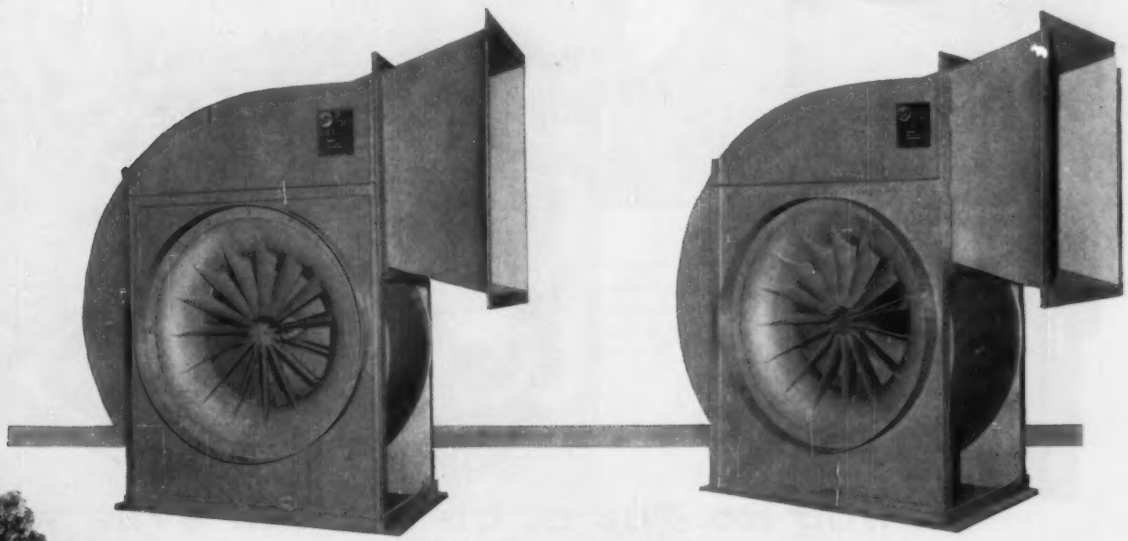
—THESE "BUFFALO" DRAFT FANS OFFER IMPORTANT ADVANTAGES

High Efficiency Over a Broad Range—Type "BLH" F. D. Fan

This backward-curve fan is providing performance characteristics highly desirable for many stations. Designed for Classes II-IV operation (system pressures above 3¾"), its mechanical efficiency is above 80% over a very broad range, providing flexibility over wide load variations. Its complete streamlining includes the proven inlet bell, directional inlet vanes, backward curve blades, wheel-suited housing and divergent outlet — features offered exclusively by "Buffalo". Like the "Buffalo" Airfoil Fans, the "BLH" is used efficiently with "Buffalo" Variable Inlet Vane volume control. Write for Bulletin F-200.

Maximum Efficiency for Specific Operating Conditions— Type "BA" Airfoil F. D. Fan

"Buffalo" Airfoil Fans offer mechanical efficiency up to 92%, and are available with a choice of three wheels to match widely varying pressure requirements. These fans have extra-wide blades for a deep "bite" — extremely good inlet conditions, thanks to the smooth inlet bell and matching curved wheel flange — plus excellent static conversion thru the unique new "Buffalo" divergent outlet. Available with "Buffalo" Variable Inlet vanes — which do not reduce performance — for volume control. Write for Bulletin FD-106 for full details.



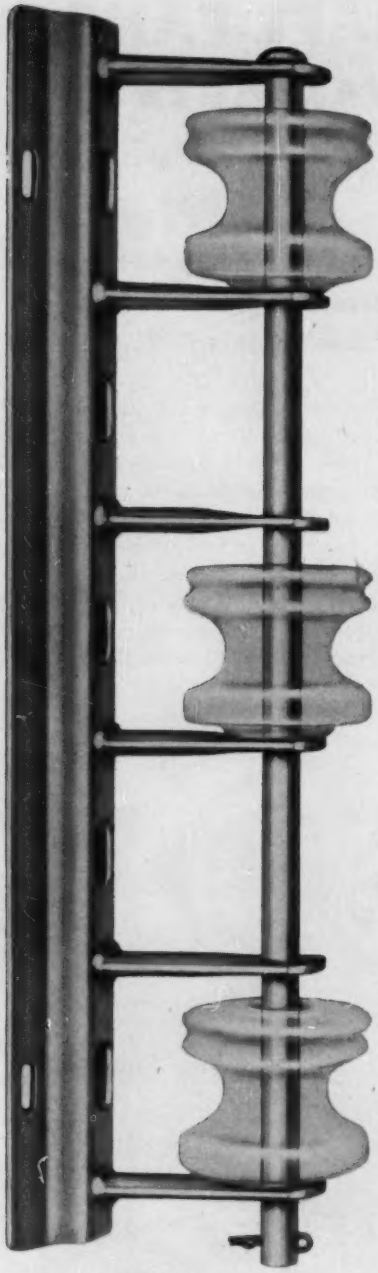
In every "Buffalo" product is the "Q" Factor, or built-in Quality which provides trouble-free satisfaction and long life.

BUFFALO FORGE COMPANY
BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

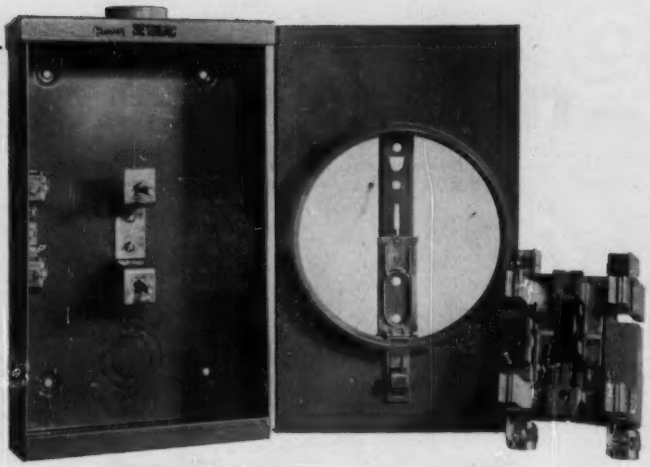
VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING



Secondary Racks . . .

. . . are light and sturdy. Two-, three-, and four-wire types come in extended or non-extended back styles. The electro-forged racks support high dead-end and cantilever loads. Oval-shaped legs are non-abrasive for safe wire stringing. Hot-dip galvanized.

Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.

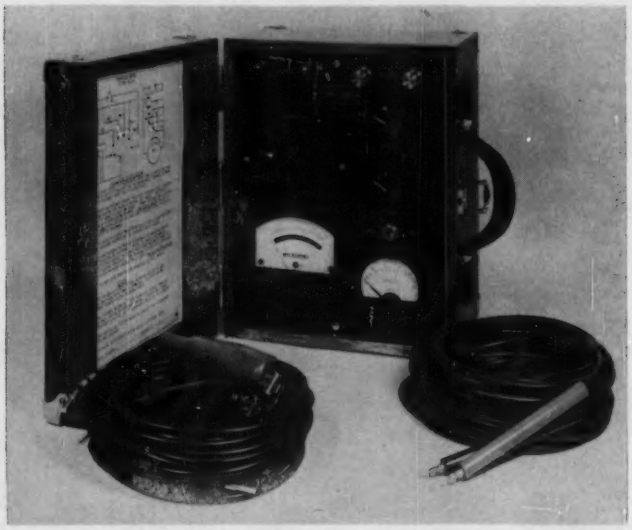


Meter By-Pass . . .

. . . can be operated manually by meterman with screwdriver. This allows meter changing without interruption of service. By-pass is located behind meter within the mounting box, and cannot be operated until utility seal and meter ring have been removed. Then downward pressure on a tab places shunt in operation, permitting removal of meter while service continues.

The device fits standard multiple-unit troughs, and is interchangeable with interiors of other devices.

Murray Mfg Corp, 1250 Atlantic Ave, Brooklyn 16, N. Y.

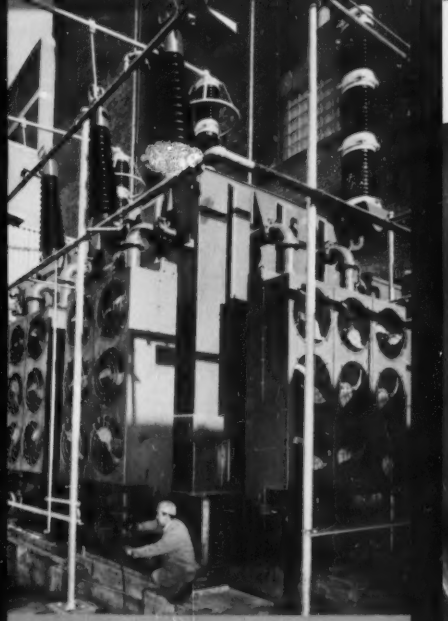


Low-R Ohmmeter . . .

. . . checks breaker contacts of oil and air circuit breakers without disassembling the breakers. A service-type instrument with accuracy of ±2%, it reads directly in microhms on 0-75 range. Selector switch cuts in multipliers of 10, 100, 1,000, and 10,000. "Core-magnet" type indicators are used. Current and potential leads supplied are 20 ft long.

J. W. Dice Co, Englewood, N. J.

(More New Equipment on page 93)



Two-step reduction in power transformer insulation levels has been proved in service and recommended as sound engineering practice. Rapid advances in lightning arrester design and improved performance in recent years are largely responsible for this development. The result has been a Westinghouse transformer offering the electric utility industry major investment and operating savings.

Mr. C. W. Miller, Manager, Power Transformer Engineering, and Mr. A. M. Opsahl, Lightning Arrester Designer and Development Engineer, discuss the parallel development of improved arresters and balanced insulation of transformers.

LOWER INSULATION LEVELS

Now save utilities up to 30% on power transformer original costs alone

. . . ANOTHER EXAMPLE OF PRODUCT IMPROVEMENT

FROM PLOWBACK OF EARNINGS INTO RESEARCH

YOU CAN BE SURE... IF IT'S Westinghouse

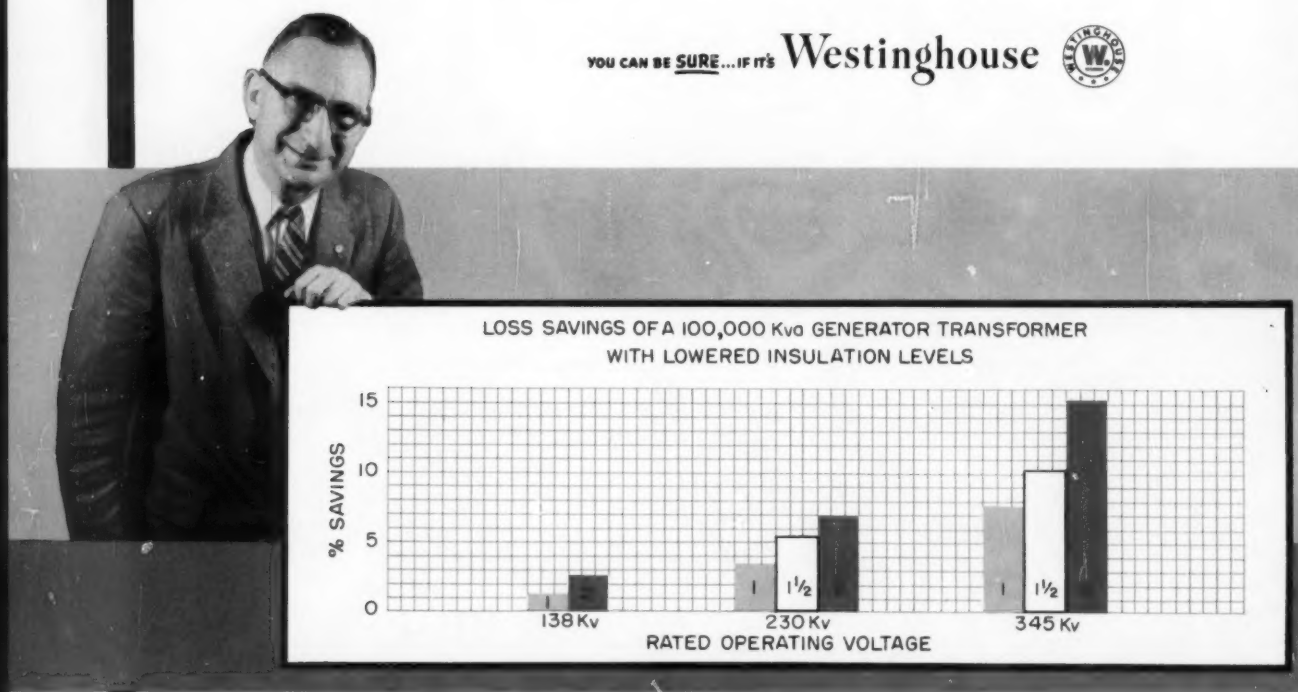
DEVELOPED THROUGH WESTINGHOUSE PLOWBACK INTO RESEARCH . . .

Lower insulation levels slash utility power transformer original investment and operating costs!

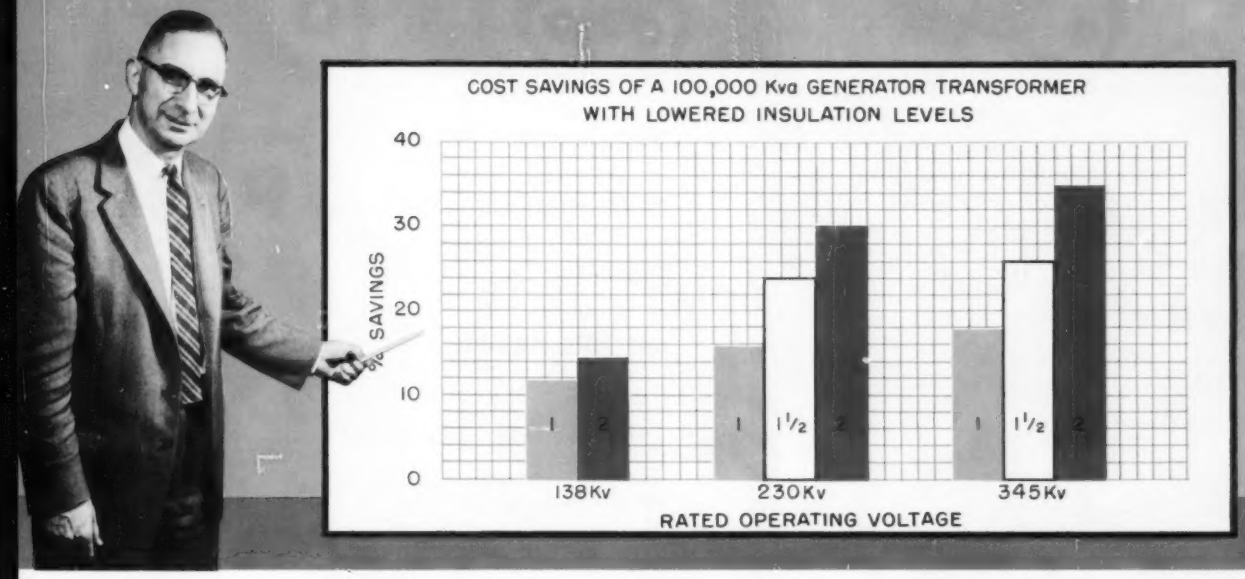
● These are the results of continuing research and development by Westinghouse since the first use of a lower-than-standard insulation level in the early 1920's. Power transformers with still lower levels of insulation now reduce utilities' cost four ways. This four-way saving with Westinghouse transformers—in lower equipment costs, reduced losses, lower impedance and reduced size and weight—has been proved for at least five years in actual service, as well as in decades of development and experimental work. This development raises considerably the practical limits of large blocks of power . . . is an outstanding example of a design with room to grow for tomorrow's growing loads.

This is another in a multitude of Westinghouse achievements made possible by plowing back profits into research and development—practical achievements that work hand-in-hand with the electric utility industry to help keep electricity America's biggest bargain.

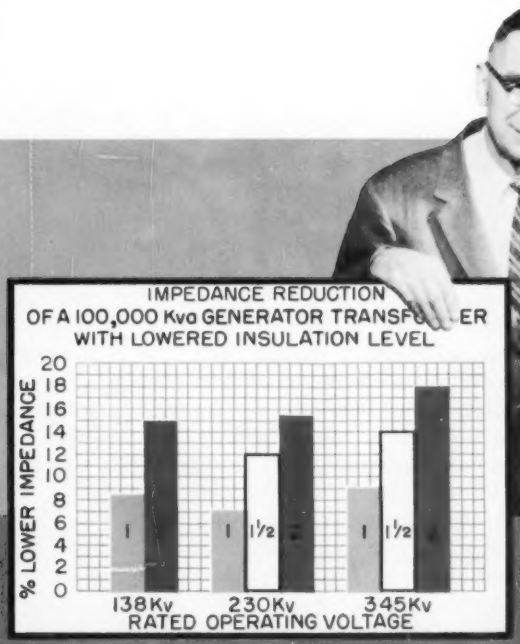
YOU CAN BE SURE...IF IT'S Westinghouse

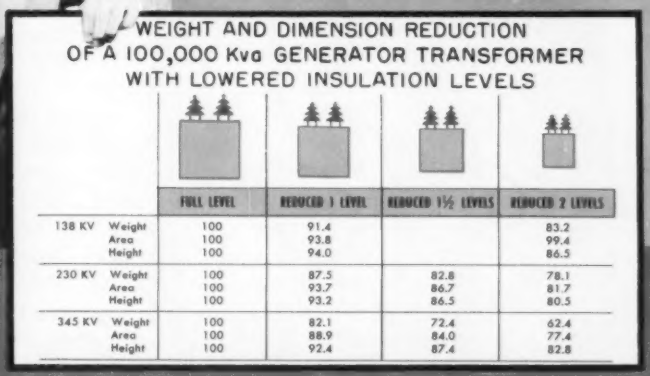


Reduced kw Losses . . . Over 7%—A large transformer has losses of as much as 1000 kw. In this area, too, Mr. Miller points out what the savings of lower insulation level can mean. The chart shows that 2-step reduction of insulation on this transformer cuts losses 7% or 42 kw. This amounts to a saving of $10,000 to $15,000 in loss evaluation.



Lower Original Costs . . . Over 30%—Mr. Miller illustrates the considerable saving in original equipment cost when transformer insulation levels are lowered. Note that the saving effected is approximately equal to the amount of reduction of the insulation level. For example, in a 230-kv transformer, a 1-step reduction means a saving of 17% , a 1½-step reduction saves 25% and a 2-step reduction saves 30% on the cost of a transformer with full-level insulation.



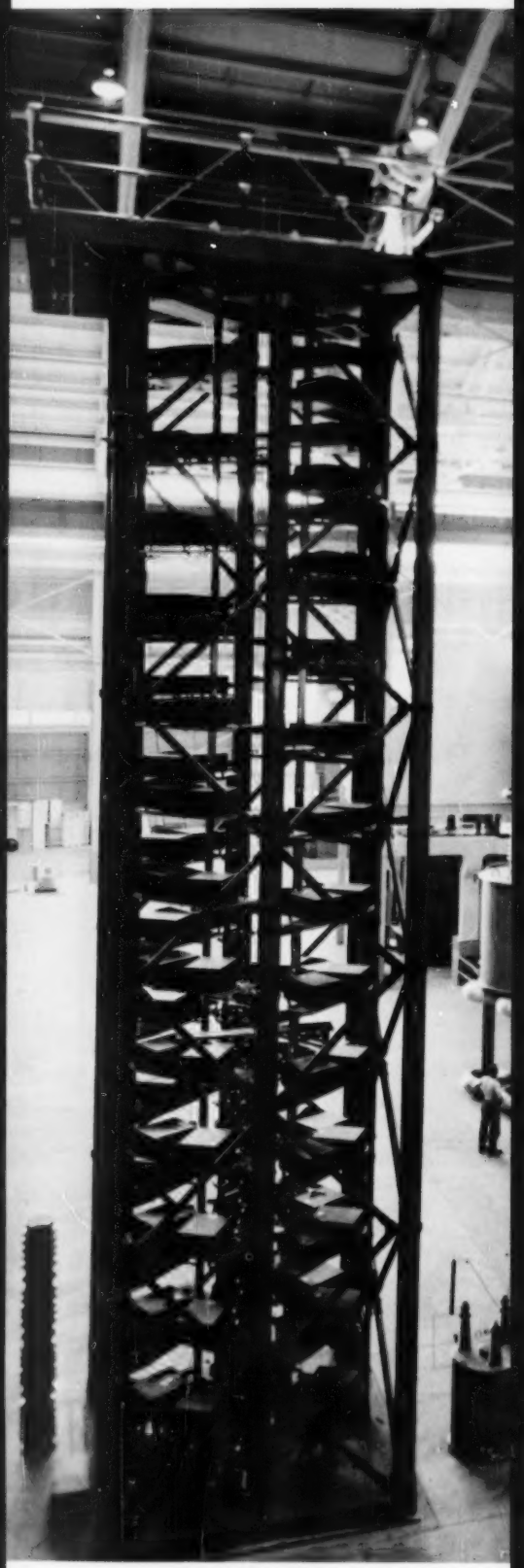


WEIGHT AND DIMENSION REDUCTION
OF A 100,000 Kva GENERATOR TRANSFORMER
WITH LOWERED INSULATION LEVELS

		FULL LEVEL	REDUCED 1 LEVEL	REDUCED 1½ LEVELS	REDUCED 2 LEVELS
138 KV	Weight	100	91.4		83.2
	Area	100	93.8		99.4
	Height	100	94.0		86.5
230 KV	Weight	100	87.5	82.8	78.1
	Area	100	93.7	86.7	81.7
	Height	100	93.2	86.5	80.5
345 KV	Weight	100	82.1	72.4	62.4
	Area	100	88.9	84.0	77.4
	Height	100	92.4	87.4	82.8

Lower Impedance . . . Over 15%—Lower insulation levels mean lower impedance, which results in further savings. A 2-step reduction in insulation level of a 230-kv transformer makes available 15% lower impedance, compared to a transformer with full level of insulation. Additional gains for utilities in the area of operating economy are realized in better system stability and voltage regulation.

Reduced Size and Weight . . . Up to 70,000 Lbs on a 100,000-kva 230-kv Transformer—The fourth major money-saving advantage of transformers with reduced insulation levels is found in their smaller sizes and weights. This means thousands of dollars saved on installation. Reduced transformer height permits reduced station structure heights; smaller size and weight permit savings in pad costs. As the demand for transformers of greater capacities grows, lower insulation levels will permit higher rated transformers to be built and shipped in one piece.



HERE IS HOW A POLICY

OF CONTINUOUS REINVESTMENT IN

WESTINGHOUSE RESEARCH

AND ENGINEERING

proves lower insulation levels practical and safe

WESTINGHOUSE TRANSFORMERS

NOW SERVING EFFICIENTLY AND SAFELY

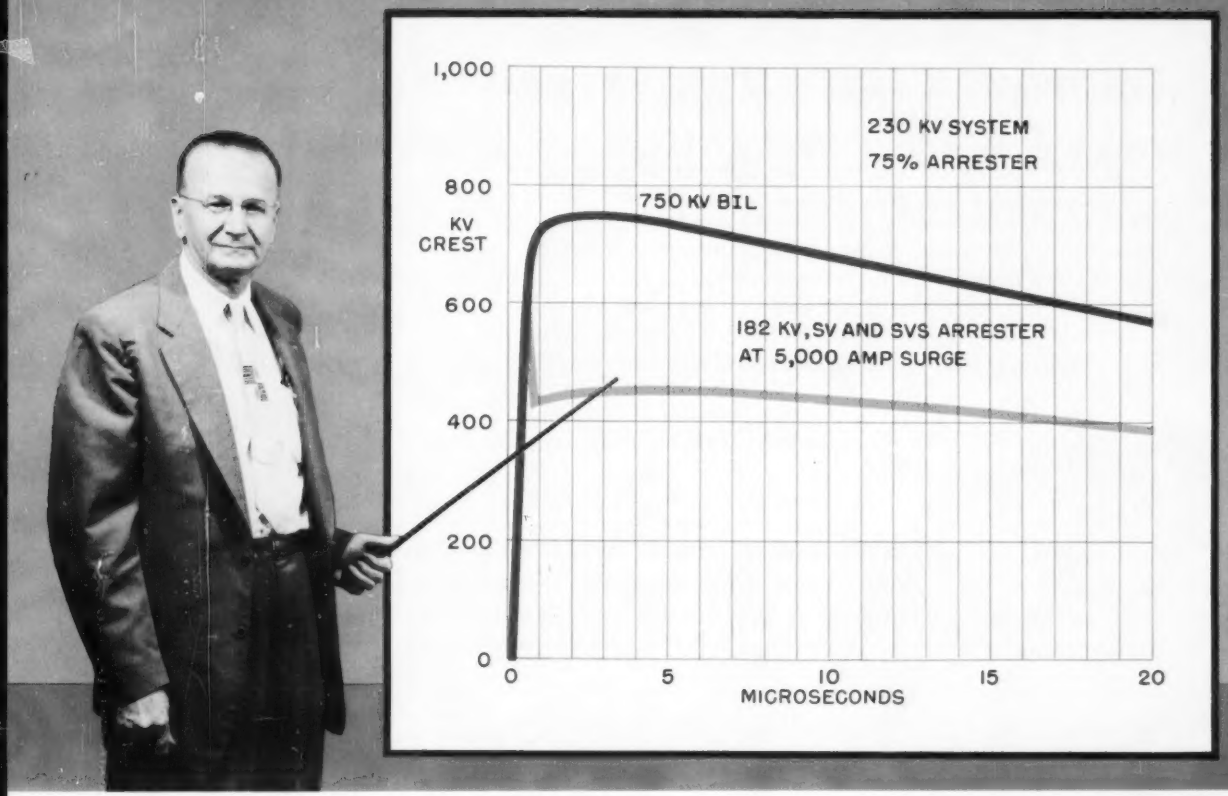
WITH BALANCED INSULATION

● Since lower insulation levels were first applied to Westinghouse Power Transformers in the early 1920's, the industry has moved steadily toward 2-step reduction. Graded insulation on transformers for grounded neutral service has been in use for many years. With the development of 345-kv systems, insulation was reduced 1½ steps; this reduction was then extended to 230-kv systems.

Westinghouse developments have contributed heavily to this trend toward lowered insulation levels. One such development was the improved SV lightning arrester, with discharge voltage reduced more than 20% over a period of years. This drop permitted protection of insulation lowered another level, without further reducing arrester ratings.

Another big stride in the development of transformers with lowered insulation levels was improved ability to withstand impulse voltages. Impulse testing of transformers, introduced by Westinghouse in the early 1930's, contributed greatly toward increased impulse strength, raising it to its present level. Impulse testing proves that transformers actually have the strength their design calls for.

5,200,000-volt surge generator at the Transformer Division new Test Center.



Mr. Opsahl shows the adequate margin of protection provided by the arrester for a 230-kv transformer with insulation reduced two steps. Similar margins of protection are assured for voltages of 138 kv through 345 kv.

Experimental work, carried out by Westinghouse in cooperation with utilities, has also contributed heavily in the trend toward 2-step reduction of insulation. Notable among these was the work at Tidd Station which resulted in 1½-step reduction in hundreds of transformers now in service throughout the country.

The results of this experimental work in the field and in Westinghouse laboratories have proved that 2-step reduction—properly designed and properly applied and protected—will give fully satisfactory service.

Impulse testing . . . your guarantee transformers have their designed strength, and more

Impulse tests on transformers are made with a 1.5 x 40 microsecond wave. The wave shape closely resembles the voltage across the arrester during discharge. Steps of test voltage establish the standard basic impulse insulation levels (B I L) which are commonly associated with circuit voltages as the full insulation level. Lowered levels of insulation have been used in higher circuit voltages where system neutral grounding permits the use of reduced rating.

YOU CAN BE SURE...IF IT'S Westinghouse

Improved lightning arresters make 2-step reduction in insulation a practical reality!

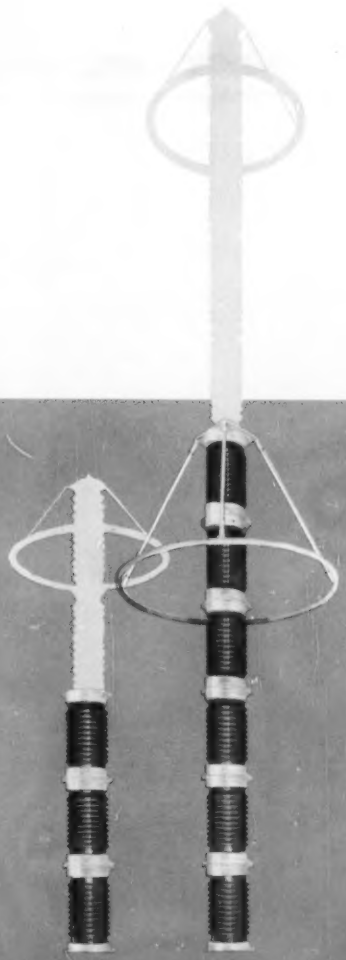
NEW LOW-IN-HEIGHT, HIGH-IN-PERFORMANCE ARRESTERS PROVIDE

GREATER PROTECTION IN LESS INSTALLED SPACE

NEW AUTOVALVE ARRESTER BLOCKS REDUCE ARRESTER DISCHARGE VOLTAGE BY 20%

Better performance of the modern Westinghouse station arrester is due in a large degree to the improved Autovalve arrester blocks and rigid quality control to which they are subjected. Each block is surge-tested under simulated service conditions far more severe than standards require.

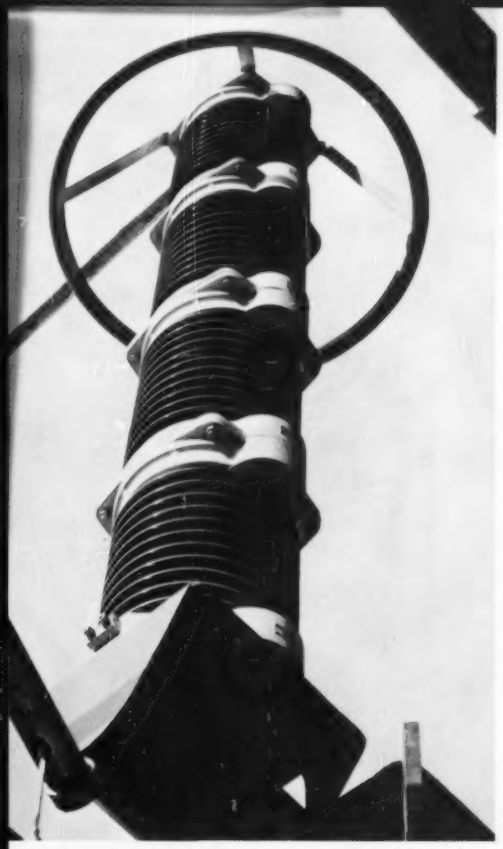
YOU CAN BE SURE...IF IT'S Westinghouse



Surge Testing of Autovalve Blocks—Tests shown here check the ability of the arrester elements to protect equipment. The surge takes place behind the screen to the right. Volt-ampere characteristics of each block are checked on the oscilloscope.

Height of Arresters Reduced 45%—Faced with the problem of increased operating requirements in less space, Westinghouse reduced lightning arrester height by almost one-half—with the same ratings. This was accomplished by physically paralleling the elements, keeping them in series electrically. These new Westinghouse SVS arresters require no supporting structure—a 20,000-pound-foot cantilever rating makes them entirely self-supporting. Installation is easier, faster, less costly . . . and the arrester now can be located closer to the transformer, physically, or directly on the transformer, providing better overall protection.

Arc Twisting Stops Arrester Electrode Pitting—New Mobilarc gaps, utilizing ceramic permanent magnets, spin the arc over the electrode, eliminating pitting and other electrode damage. Further, there is no discernible change in gap characteristics—even after as many as 1200 test operations.

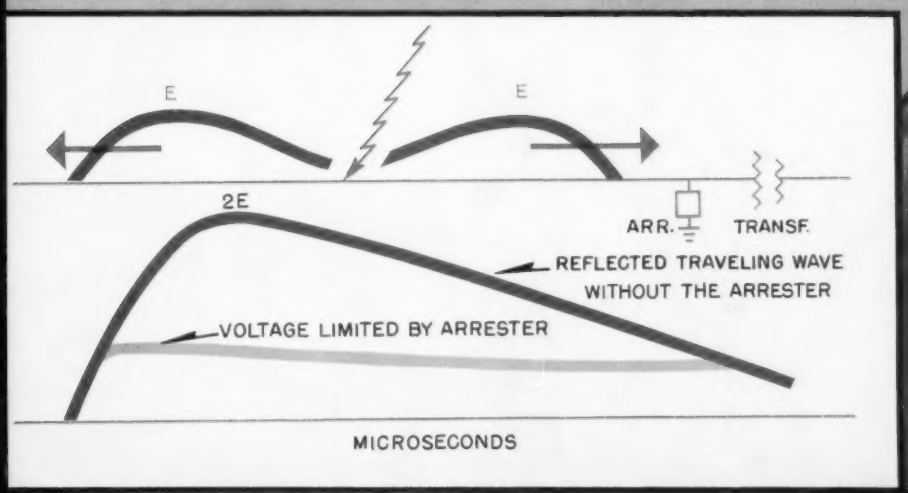


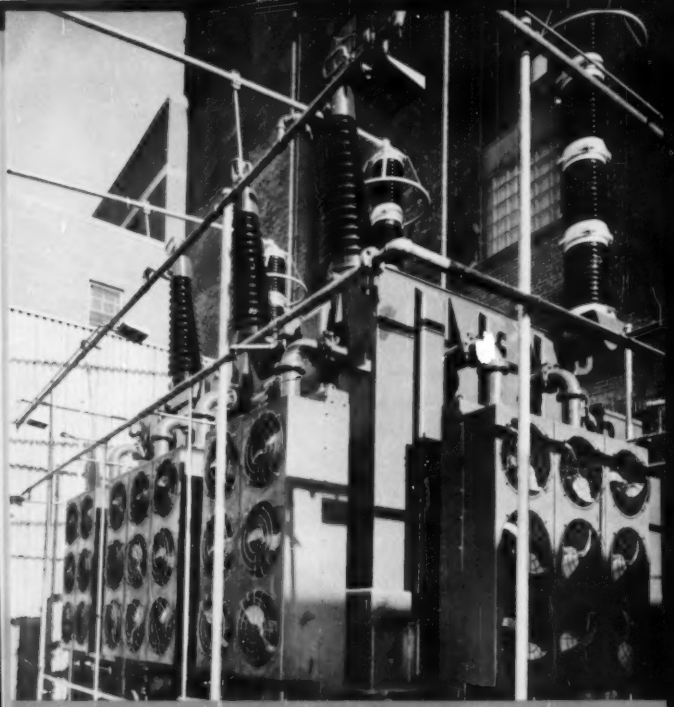
Self-supporting SVS arresters, with height reduced 45%, mount directly on power transformers rated up to 345 kv.

CONTINUING REDUCTION OF ARRESTER SURGE DISCHARGE VOLTAGES

Lightning surge voltages, above the transformer insulation level, travel along transmission lines to the transformer station. However, at the lightning arrester, this surge voltage is sharply reduced by the action of the arrester in discharging surge current from the line. Thus, the surge voltage across the arrester during surge discharge is decreased below the level of the transformer insulation, protecting the transformer from damage. Improvements in lightning arresters over the years have lowered the sparkover and discharge voltages, making possible the reduction of insulation from full level. Present arrester protection makes practical 2-step reduction where system neutral grounding permits the use of arresters rated 75% of circuit voltage.

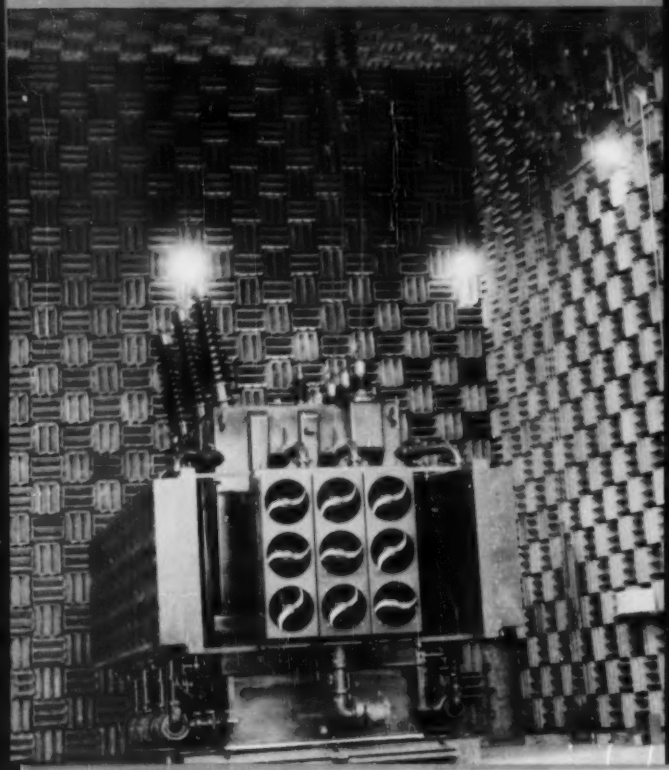
When lightning strikes, the surge voltage (E) travels the line in both directions from the struck point. At the transformer, the voltage could double to 2E. The lower wave shows the effect of the arrester on the surge voltage, limiting it to a voltage below the insulation level of the transformer.





This 240,000-kv FOA generator step-up transformer is installed at Niagara Mohawk Power Corporation's Huntley Station. Use of lower insulation levels made possible one-piece shipment of this 825-kv BIL transformer.

The Sharon Sound Laboratory is an integral part of the giant Westinghouse Test Center at the Transformer Division. It is in this test center where much of the research on lower insulation levels is conducted. Here, a half-million-pound giant is checked out before shipment.



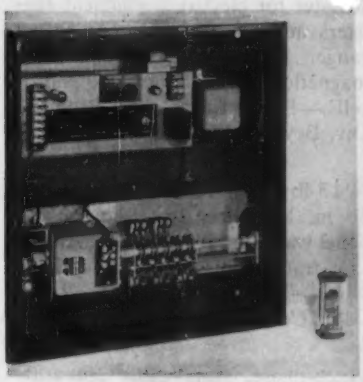
Plowback into research and engineering at Westinghouse goes hand-in-hand with industry progress

Westinghouse has pioneered, field-tested, produced and recommended as sound engineering practice lower insulation levels, because it is in the best interests of the industry. The proof is in the savings—up to 35% in transformer cost, with additional installation and operating savings, plus a gain in operating efficiency.

Ask your Westinghouse representative to explain how the advantages of lower insulation levels can go to work for you.

CP-1043

YOU CAN BE SURE...IF IT'S Westinghouse



Indoor Light Control . . .

. . . for commercial buildings automatically regulates indoor lighting levels. Phototubes measure incoming daylight, and signal switching motors which turn artificial lighting on or off in proper amounts.

Delay timer prevents unnecessary dimming of lights between passing clouds. Manual switch is provided for turning off all lights when room is vacant. System works on fluorescent or incandescent lights. **Minneapolis-Honeywell Regulator Co, 2753 Fourth Ave S., Minneapolis, Minn.**

Measuring Wheel. . .

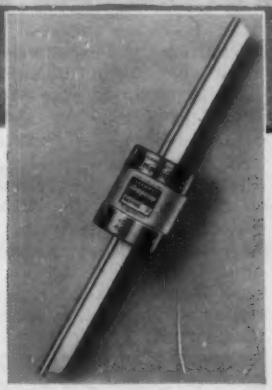
. . . has extended handle to permit taking distance measurements from a vehicle. Calibrated wheel and counting mechanism give accurate measurements, recorded in feet, up to almost 19 mi.
Rolatape, Inc, 1741 Fourteenth St, Santa Monica, Cal.

MORE NEW PRODUCTS

Cable support systems of aluminum-coated steel are strong, resist corrosion.—Chalfant Products Co, Inc, 11525 Madison Ave, Cleveland 2, Ohio

Periscope flashlight lets inspectors and servicemen see around corners and into small openings. End can be rotated 360 deg.—Laging-Schultz Co, Mountain Lake, Minn.

(*More New Products on page* 94)



SHAWMUT
Amp-trap*

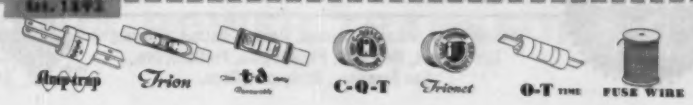
. . . THE SUPER-CURRENT SLAYER

When you want to kill giant Short-Circuits almost before they start — some form of Amp-trap can do it. Amp-trap will limit peak available short-circuit currents on low voltage circuits and prevent them from developing full magnetic or thermal destructive force. Ask about Amp-trap and its many capacities and arrangements. Find out about this amazing current limiter now. It is an entirely new form of protective device with current limiting action on short-circuit currents up to 100,000 Amperes R.M.S. or 200,000 Amperes (peak), at 600 Volts. Because Amp-trap *anticipates* destruction it protects your investment by eliminating the need for replacement. Write for Bulletin 514. There is no obligation.

*Trade Mark Registered.

REGISTERED UNITED STATES PATENT OFFICE
Est. 1892

AMP-TRAPS — "Awake At The Switch"
THE CHASE-SHAWMUT CO.
374 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS



It's NEW!

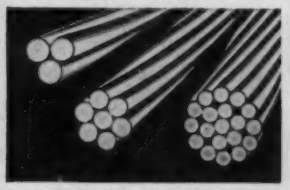
Wire that combines the strength of steel with the high corrosion resistance of aluminum

ACCO It's *Aluminized!*

PAGE STRAND

PAGE has successfully combined two time-tested metals into a revolutionary new wire—ACCO ALUMINIZED—that has a ductile, protective coating of aluminum *bonded* to iron and steel wire by a hot-dip method. This product is covered by and is manufactured under processes covered by U.S. and foreign patents.

Now PAGE offers ACCO ALUMINIZED Steel Strand for guy wire, ground wire and messenger wire applications. Can be used with Preformed Guy-Grip dead-ends made of ACCO ALUMINIZED Wire, or with galvanized pole hardware. Here is evidence of ACCO ALUMINIZED Steel Strand's superiority: salt spray tests conducted in strict accordance with ASTM procedures show that, for equal thickness of coating, aluminized *outlasts galvanized by more than 2 to 1.*



Also...PAGE *Aluminized* ACSR CORE WIRE

Aluminum Conductor Cable with PAGE ACCO ALUMINIZED ACSR Core Wire is now available from many manufacturers of conductor cable. Product quality control is assured by a special testing procedure mutually developed by PAGE and ALCOA.

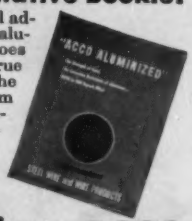
ALL STANDARD GRADES

PAGE ACCO ALUMINIZED Steel Strand is available in Common, Siemans-Martin, High Strength, Extra High Strength and Utility grades with physical properties meeting ASTM Spec. A-122-54-T and A-363-55-T.

NOTE: We will continue to make and market PAGE Stainless Steel Strand and PAGE Galvanized Strand, as heretofore, in 3-, 7- and 19-wire construction.

Send for Informative Booklet

How about ductility and adherence properties of aluminized wire? Why does aluminizing create a true duplex coating over the core? How does aluminum "sacrifice itself" to provide electrochemical protection? For answers, write us at Monessen, Pa., asking for **Booklet DH537-A.**



ACCO for Better Values

Page Steel and Wire Division
AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Bridgeport, Conn.

ACCO

Booster for electro-mechanical registers adds to their life and speed range. Energized by electrical or magnetic fields, it involves no photocells.—Post Electronic Products Div, Beverly, Mass.

A 13-lb metal **warning sign** stands 30 in. high, has 18x18-in. yellow panel with 5-in. black letters. Angle-iron frame folds flat for easy handling.—T. J. Cope Div, Rome Cable Corp, Collegeville, Pa.

Three-phase, four-wire 200-400-amp **transformer cabinets** feature welded construction, louvered doors, and heavy-duty hinges. Dimensions are 39x34x12 in. Weight: 205 lb. —Erickson Electrical Equipment Co, 4460 N. Elston Ave, Chicago 30, Ill.

Solvent-emulsifier degreases porcelain insulators carrying busbars, reducing risk of flashovers. Also useful for metal degreasing.—Arnold, Hoffman & Co, Inc, Providence, R. I.

Fully-magnetic **circuit breaker** can be plugged into load center quickly with one hand. Available in ratings from 15 to 50 amp, the breaker can be reset immediately after tripping. —Murray Mfg Corp, 1250 Atlantic Ave, Brooklyn 16, N. Y.

Forced-air cooled **germanium rectifiers** have air-to-water heat exchangers. Replacing rectifier elements involves no liquid connections. Unit is totally enclosed. Designed for electro-chemical and steel industries.—Allis-Chalmers Mfg Co, Milwaukee 1, Wis.

Solenoid-operated **drain valve** for controlled draining has no cavities or obstructions to collect foreign matter. Dumping capacity is up to 118 gpm.—Automatic Switch Co, Florham Park, N. J.

Spirally-cut **cable cover** overlaps itself to form double thickness, leaves no open points. Made of "Teflon", it withstands 200C. Available in six diameters up to 1½ in.—Illumitronic Engineering, 680 E. Taylor, Sunnyvale, Cal.

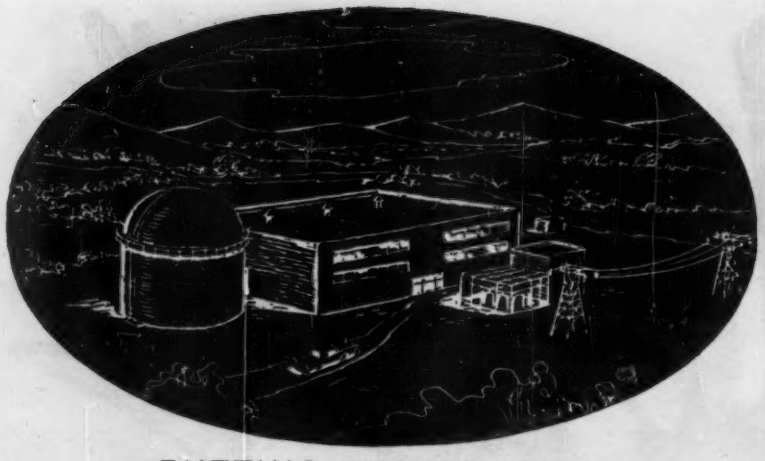
(*More New Products on page* 96)

SHELL FORM
CORE FORM
Substation Transformer
100,000 KVA, 3 Phase
With load tap changing equipment. High Voltage: 330,000 Grd Y volts with ±10% regulation in 32 steps of ⅝%. Low Voltage: 14,400Δ volts.
Generating Station Transformer
48,000 KVA, 3 Phase
High Voltage: 115,000 Grd Y volts. Low Voltage: 13,200Δ volts.

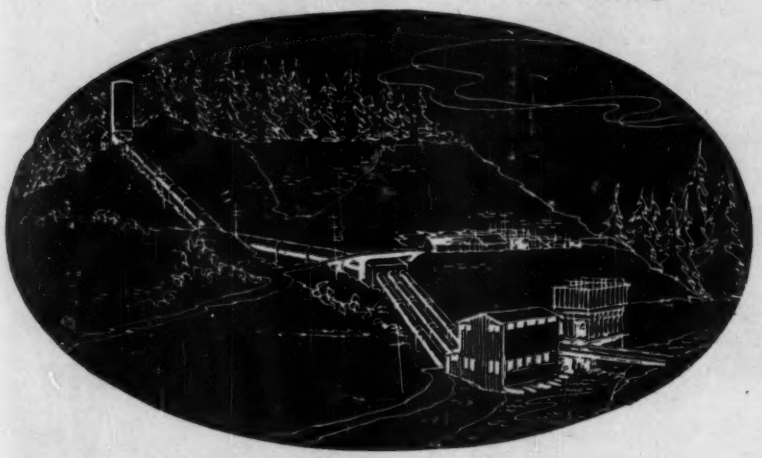
Pennsylvania builds *Both* types of Power Transformers for Generating Station and Substation Service

With wide experience in both shell form and core form design, Pennsylvania Transformer engineers are able to provide the transformer that is best suited to every application. Full consideration is given to size and weight, ease of installation, impedance, resistance to short circuit stresses, insulation strength, method of cooling, and other characteristics which result in definite advantages in a given kva and voltage for one design or the other. **Core form or shell form?** Why not let the answer for your next transformer be based on Pennsylvania's proved principles of power transformer design? Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

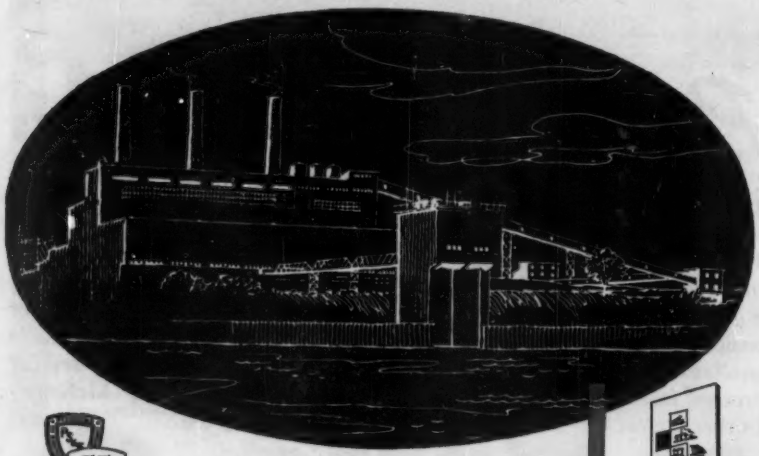
PENNSYLVANIA POWER TRANSFORMERS



PUTTING **POWER** INTO
YOUR EXPANDING PROGRAMS



ATOMIC, HYDRO and FOSSIL FUEL POWER PLANT DESIGN
FOR INDUSTRIALS and UTILITIES



55 YEARS

Pioneer Service & Engineering Co.

231 South La Salle Street • Chicago, Illinois

Send for our descriptive booklet, "Pioneering New Horizons" of these and other services.

Screwholding screwdriver speeds meter repair. Pressure against screw expands twin bits, holding screw in place until threads catch.—The H. J. J. Co, 268 Marlow Dr, Oakland, Cal.

Connectors for liquid-tight flexible conduit have insulated throat to protect conductors from abrasion and facilitate wire pulling.—The Thomas & Betts Co, 36 Butler St, Elizabeth, N. J.

Type "G" horsepower rated, 30-amp, 125-250-v **safety switch** features easily removable fuses and a bakelite block. It protects light machinery.—Murray Mfg Corp, 1250 Atlantic Ave, Brooklyn 16, N. Y.

Electronic **motor analyzer,** for production quality control, tests 6 to 10 components per min. Applications include electric motors, solenoids, coils, magnetic materials.—Automatic Development Co, 2530 N. Naomi St, Burbank, Cal.

Thermostatically-controlled **engine preheaters** plug into electric outlet. They allow outside vehicle storage, quick morning starts.—Tech Products, Inc, 615 Pennsylvania Ave, Elizabeth, N. J.

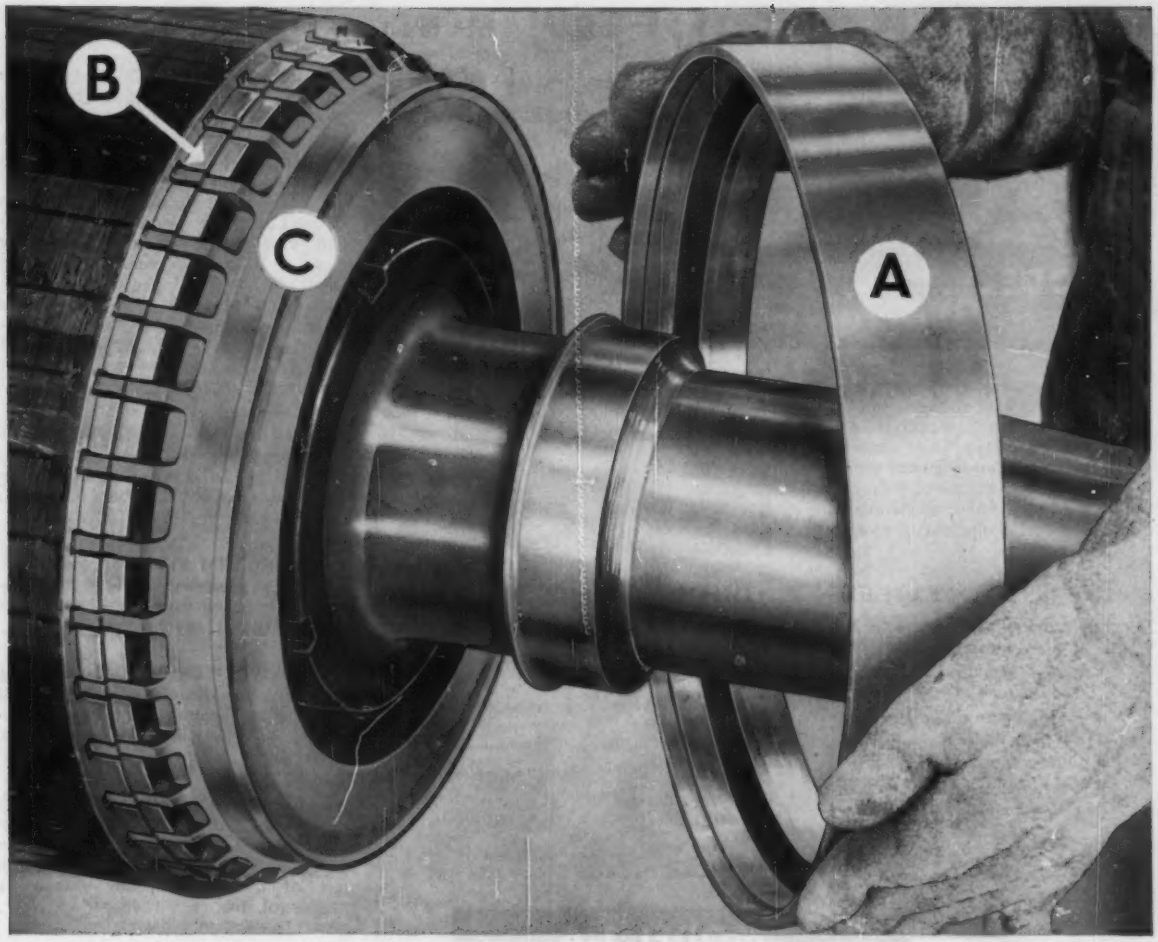
Calked steel soles for line patrolmen are strapped to boot to prevent slipping.—Industrial Products Co, 2808 N. Fourth St, Philadelphia 33, Pa.

One-can **ballasts** for 4-, 6-, and 8-ft fluorescent lamps are suitable for cold-weather operation. They are small and light.—Jefferson Electric Co, Bellwood, Ill.

Compact **battery charger** for industrial trucks plugs into ordinary electrical outlet, needs no special wiring. It mounts on wall, on truck battery, or elsewhere.—C&D Batteries, Inc, Conshohocken, Pa.

Erratum

The ultrasonic cleaner from Acoustica Associates, Inc, described in EW, Nov. 18, 1957, page 109, operates on 115 v ac; not dc, as EW reported.



Retainer ring construction is used in E-M Induction Motors rated 900 hp and larger at 3600 rpm, and 1750 hp and larger at 1800 rpm. It's just one of many special features built into every large, E-M Induction Motor.

"Ring around the end ring" locks

Rotational Stability...

into BF pump motors

"I'm Ev Jernberg, Chief Mechanical Engineer at E-M. Over the years we've learned a good deal about building big induction motors. One problem was to retain rotational stability on high-speed applications.

"At E-M we 'lock' precise factory balance into our rotors by shrinking accurately machined, non-magnetic alloy retaining rings around the cage end rings. This supports the 'floating' end rings against centrifugal force and anchors them to the shaft. The retainer (A) is shrunk onto the shaft-connected, rotor endplate (B) and locks the 'floating' end ring (C) perfectly concentric to the shaft. The possibility of unbalance from centrifugal and thermal distortion of the cage winding is thus permanently eliminated."

For further information about E-M Motors, call your nearby E-M Sales Engineer and write for brochure PRD-214.

E-M

1300-TPA-2194

ELECTRIC MACHINERY MFG. COMPANY

Minneapolis 13, Minnesota

Specialists in making motors do

EXACTLY WHAT YOU WANT THEM TO

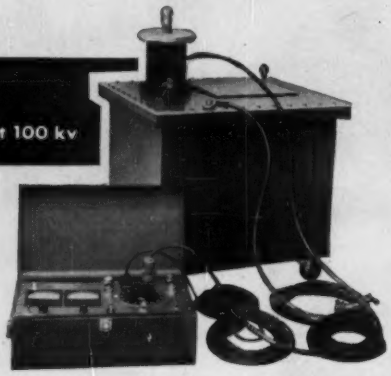
BIDDLE DIELECTRIC TEST EQUIPMENT

. . . for measuring direct current at voltages up to 100 kv when applied to the insulation of generators, transformers, bushings, cable, etc.

New

MODEL 2

current output 6 ma continuous at 100 kv



More and more engineers are leaning to d-c testing with voltages equal to or somewhat greater than equivalent peak alternating voltages. Their experience and increased knowledge and appreciation of the advantages of testing with direct voltage have accelerated the need for test equipment to meet field requirements.

IMPORTANT FEATURES

- Well-designed provisions for utmost safety
- Simple operation and reliable performance
- Excellent output voltage regulation
- Compact, mobile design
- Facilities for voltage and leakage current measurements

IMPORTANT APPLICATIONS

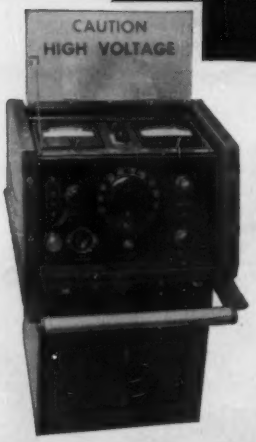
. . . *in development* . . . for testing the d-c dielectric strength of insulating materials and the adequacy of the electric design of insulation in any type of electrical equipment.

. . . *in production* . . . for non-destructively detecting defects in the insulation of electrical equipment due to design, material, and workmanship.

New

MODEL 1-A

3 ma continuous at 40 kv



. . . *in maintenance* . . . for non-destructively detecting unreliable condition of insulation of new or repaired electrical equipment. Preventive maintenance tests on important rotating equipment, cable, switchgear, etc., result in appreciable savings.

For important details regarding these units and information on the subject of high voltage d-c testing *write for our New Bulletin 22-W.*

B-800

JAMES G. BIDDLE CO.

1316 ARCH STREET • PHILADELPHIA 7, PA.

ELECTRICAL TESTING INSTRUMENTS • SPEED MEASURING INSTRUMENTS
LABORATORY & SCIENTIFIC EQUIPMENT

James G. Biddle Co.
1316 Arch St., Phila. 7, Pa.
Please send me
BULLETIN 22-W

Name_____
Company_____
Address_____
City_____ Zone____ State____

CATALOGS–BULLETINS

• **WIRE, CABLE & CONDUIT:** Bulletins are available from Rome Cable Corp on the topics listed below.

Guide to Representative Wire, Cable, & Conduit (6-p) contains 30 photographs. (EW-1234)

Polyethylene Sheathed High-Voltage Power Cables are described in a 6-p bulletin with specifications and applications of a new sheathing compound. (EW-1235)

Cathodic Protection Cable for Buried or Underwater Metallic Structures discusses two cables with copper or aluminum conductors in sizes 8 through 4/0 AWG. (EW-1236)

• **DISTRIBUTION TRANSFORMERS:** Single-phase type OS transformers rated up to 15 kv, 167 kva get detailed coverage in a 16-p booklet from Delta-Star Div of H. K. Porter Co. (EW-1237)

• **FIRE ALARM SYSTEMS:** The Autocall Co has published 46 pages of descriptime material on their line of fire alarm systems. (EW-1238)

• **STANDBY POWER PLANTS:** A 4-p brochure from Katolight Corp contains lists and information of emergency generating sets available up to 500 kva. (EW-1239)

• **SAFETY CONTROLS:** Use of their liquid level and flow controls at the Experimental Boiling Water Reactor, Argonne National Laboratories, is the subject of a 10-p brochure offered by Magnetrol, Inc. (EW-1240)

• **COLLECTOR RINGS:** A folder from The B. A. Wesche Electric Co shows how to estimate two types of collector rings: cylindrical and annular. (EW-1241)

• **RECORDING EQUIPMENT:** Clary Corp has published a 6-p brochure on its complete line of digital recording equipment. (EW-1242)

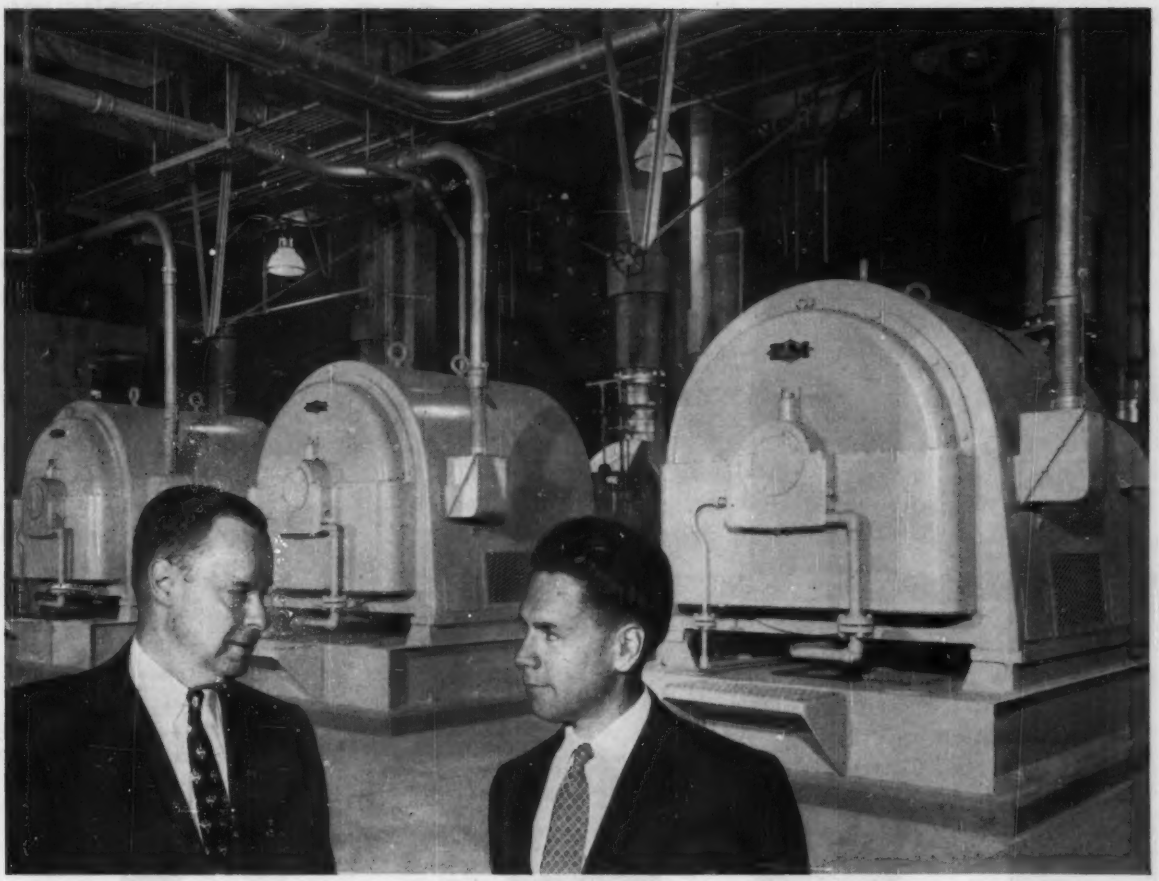
• **FLUORESCENT EQUIPMENT:** An 8-p catalog gives condensed information of Smithcraft Lighting's line of commercial and industrial fluorescent units, recessed troffers and ceiling systems. (EW-1243)

• **CABLE SUPPORTS:** A folder that can be used as a file for data on cable supports comes from T. J. Cope Div of Rome Cable Corp. (EW 1244)

• **AIR CONDITIONERS:** A 16-p catalog describes the American Blower line of "Inductor" air conditioners for perimeter conditioning of multi-storied buildings. (EW-1245)

• **GUY STRAND:** An 8-p bulletin provides engineering information on Copperweld non-rusting guy strand. (EW-1246)

(*More Catalogs on page* 102)



Gerry Oscarson, Chief E-M Application Engineer, points out to Ev Jernberg, Chief E-M Mechanical Engineer, the excellent on-the-job dependability record of three, 1500 hp, 3600 rpm E-M Induction Motors driving BF pumps at a big, upper midwest power plant.

These motors show that E-M locked-in

Rotational Stability...

keeps BF pumps running smoothly

"You know, Ev, these three E-M Induction Motors have been on duty here for 24 hours a day for the past four years. The extra pains we take at the factory to make sure our motors keep their perfect balance looks like it's paying off in smooth service and low maintenance."

"That's right, Gerry. Our method of securing the cage end rings with shrunk-on, high strength alloy retaining rings has certainly worked well. Even heavy centrifugal and thermal stresses can't damage these cages. The specially designed retaining ring gives our customers the dependability they need in high speed auxiliary drives."

You, too, can benefit from the special attention E-M gives to rotational stability. Write the factory for Induction Motor brochure PRD-214, and call your nearby E-M Field Engineer for firsthand information about dependable Induction Motors.

E-M

1338-TPA-2158

ELECTRIC MACHINERY MFG. COMPANY

Minneapolis 13, Minnesota

Specialists in making motors do

EXACTLY WHAT YOU WANT THEM TO

ALCOA ANNOUNCES

62%

CONDUCTIVITY FOR ALUMINUM CONDUCTORS

CONDUCTIVITY GUARANTEED—All difficulties and technicalities involved in supplying this new high-quality conductor have already been worked out. Right now, we are shipping redraw rod and conductor with minimum guaranteed conductivity of 62% IACS (International Annealed Copper Standard).

NO DECREASE IN TENSILE STRENGTH—Users of Alcoa® Aluminum Conductors will have to make no adjustments to compensate for changes in physical characteristics of this new high-conductivity conductor. There has been no downward revision in tensile strengths or mechanical properties of Alcoa redraw rods or conductors.

NO INCREASE IN COST—This remarkable new development in electrical technology is offered to the industry at no increase in cost over EC grades of conductor formerly supplied.

WHAT THIS MEANS TO YOU—The advantage in using 62% aluminum conductor can be computed as an increase in the conductivity of the conductor. Assuming the following conditions, here is a rather favorable example based on the capitalization factor:

1,113,000 cm 61 strand aluminum Weight = 1.045 lbs per foot Peak load current = 600 amps
Line losses = $0.005 per kwh Load factor = 50% Avg. operating temp. = 50°C
Interest rate on investment = 4% Amortization period = 30 years
For 61% conductivity $r_a = 0.0954\Omega$/mi. $P_L = 1^2 r_a = 600^2 \times .0954 = 34.34$ kw per conductor mile
From Section 13-1 *Standard Handbook for Electrical Engineers*, curve of annual energy loss for given peak load at various load factors.

Energy loss = $34.34 \times 2650 = 91{,}000$ kwh
Annual cost of losses = $91{,}000 \times .005 = \$455$ per conductor mile
For 62% conductivity $r_a = 0.0939\Omega$/mi.
Therefore, annual cost of losses = $447.85 per conductor mile
Annual savings = $455.00—$447.85 = $7.15 per conductor mile

$$\text{Present value of benefits} = C\frac{1-(1+i)^{-n}}{i}$$ where i = interest rate, n = amortization period, C = annual savings

$$\text{Present worth of benefits} = 7.15\frac{1-(1+.04)^{-30}}{.04} = \$123.60 \text{ per conductor mile}$$

Converting to a per-pound value

$$\text{Present value} = \frac{123.60}{5280 \times 1.045} = \$0.0224 \text{ per lb}$$

This means one could afford to pay up to 2.24 cents per-pound premium for 62% conductivity aluminum conductor based on the annual benefits received.

Or, on the other hand, if you're a skeptic and not particularly concerned with the future, consider that one merely wants to buy a conductor of a given resistance. If the price of 1,113,000 cm 61% conductivity is $0.3902 per lb, the resistance equivalent 62% conductivity conductor yields a benefit of $62/61 \times .3902$ or $0.3967 per pound.

This means, of course, that the 62% conductivity conductor represents a saving of $0.0065 per pound.

Your Guide to the Best in Aluminum Value

"ALCOA THEATRE"
Exciting Adventure, Alternate Monday Evenings

Catalogs—Bulletins

(*Continued from page* 98)

• **MOTORS & CONTROLS:** Reliance Electric & Engineering Co describes their operations and products in a 12-p booklet, "Sky High to Ocean Blue." (EW-1247)

• **PORCELAIN:** A 4-p brochure recounts history and achievements of Porcelain Products, Inc. (EW-1248)

• **CUTOUTS & SWITCHES:** Southern States Equipment Corp has published two bulletins:

Distribution Cutouts (6 pp) covers four types, what they are and how they work. (EW-1249)

Type RDC Double Side-Break Switch (4 pp) describes a switch rated 34.5 to 450 kv, 600 to 2,000 amp. (EW-1250)

• **MOTOR CONTROLS:** High-voltage starters for 2.3- to 5-kv motors are the subject of an 8-p bulletin from Allis-Chalmers Mfg Co. (EW-1251)

• **HIGH-FREQUENCY LIGHTING:** Four papers on theory, generation, and application of high-frequency high-voltage current to lighting have been bound together by The Wakefield Co into a 28-p booklet. A catalog of the company's equipment is included. (EW-1252)

• **SLING CHAINS:** American Chain & Cable Co gives data on sling chains in a 4-p bulletin. (EW-1253)

• **FEEDER SYSTEMS:** A 24-p catalog explains operation of plug-in power distribution systems for 3- and 4-wire, 600-v service. Electrical Distribution Products, Inc. (EW-1254)

• **V-BELT DRIVES:** Dodge Mfg Corp has published a 108-p book of information, tables, and pictures on their line of pre-engineered drives. (EW-1255)

• **DISCONNECT EQUIPMENT:** S&C Electric Co has published two bulletins on load-switching apparatus.

Portable Loadbreak Tool, "Loadbuster," is the subject of a 10-pager. (EW-1256)

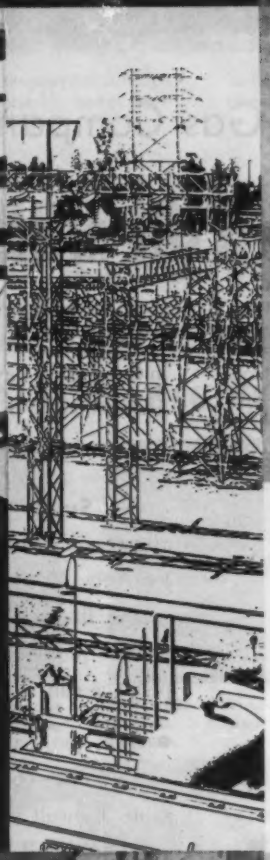
Tool-Operated Disconnect, which works with "Loadbuster" and is rated 400 amp, 15 kv, is dealt with in a separate bulletin. (EW-1257)

• **MISCELLANEOUS:** The following bulletins come from General Electric Co.

Two-Way Mobile Radio Equipment (38 pp) contains details on items which help make a system flexible. (EW-1258)

High-Frequency Capacitors (6-pp) includes performance data of class HF water-cooled capacitors operating from 500 to 12,000 cycles. (EW-1259)

Non-Synchronous Resistance Welding Control (12 pp) gives electrical and mechanical information on standard components. (EW-1260)



WHEN you consider expansion...
...the most important investment you can make is in the creative ability of men.

FLUOR

The Fluor Corporation, Ltd.
Engineers & Constructors
2500 S. Atlantic Blvd., Los Angeles

Public Service Electric & Gas Company reports:

Converting to aerial cable improves

The scene above is typical of much of the area served by Public Service Electric & Gas Company. The trees in these residential areas of New Jersey presented a real distribution problem. Trimming costs ran high. And in stormy weather, the trees were always a potential cause of outages. As a result, this utility began replacing the open wire lines in these problem areas with preassembled aerial cable.

Now, after installing miles of aerial cable—much of which is General Electric Super Coronol* aerial cable—Public Service Electric & Gas reports:

Improved service continuity. Converting to aerial cable has further assured a higher level of service continuity during storm conditions. Naturally, this means increased customer satisfaction.

Reduced tree trimming. Costs for tree trimming in these areas have been minimized. Minimum tree disfiguration also promotes harmonious community-utility relations.

G-E Super Coronol Aerial Cable, with both aluminum and copper conductors, has been used extensively. With reverse-lay construction, these cables enable linemen to make quick, easy taps. And, on voltage limited circuits, its 85 C rating and low impedance can result in extra savings (see charts).

● You, too, can reduce tree-trimming costs and improve service continuity with G-E Super Coronol aerial cable. Consult your G-E Wire and Cable specialist or write Section W203-1227, Wire and Cable Department, General Electric Company, Bridgeport 2, Conn.

*Registered Trade-mark General Electric Company

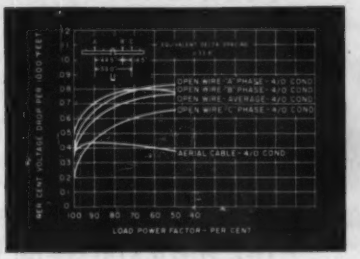
Progress Is Our Most Important Product

GENERAL ELECTRIC

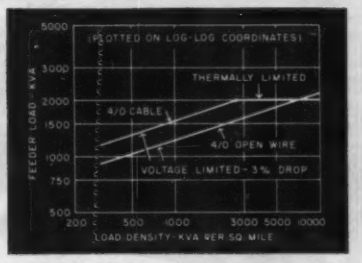
Public Service Electric & Gas Company has installed miles of General Electric reverse-lay aerial cable in its heavily-wooded areas. Note how little tree trimming is needed for this typical installation.

service, cuts tree-trimming costs

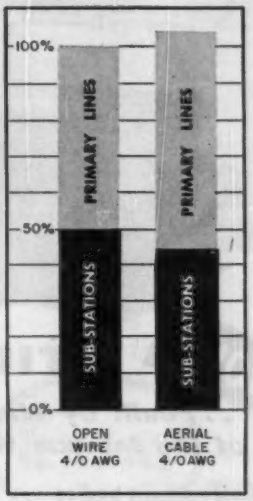
4/0 AERIAL CABLE VS 4/0 OPEN WIRE


OPEN WIRE-A PHASE-4/0 COND
OPEN WIRE-B PHASE-4/0 COND
OPEN WIRE-AVERAGE-4/0 COND
OPEN WIRE-C PHASE-4/0 COND
AERIAL CABLE-4/0 COND
LOAD POWER FACTOR - PER CENT

VOLTAGE DROP—Voltage regulation per 1000 feet 4160-volt feeders, 1000 kva base, 3 phase.



FEEDER LOADING—Load density characteristics of 4160-volt feeders with 3% voltage drop limitation.



COST—Comparative primary distribution costs per kva for voltage-limited circuits at 4160 volts.

CONNECTIONS ON LINE ARE EASY because G-E reverse-lay, preassembled cable has reversal points every 5 feet. Each conductor has sufficient slack, when unwound between reversal points, to make connections for transformers, cut-outs or laterals.

Properly Designed
COOLING RADIATORS

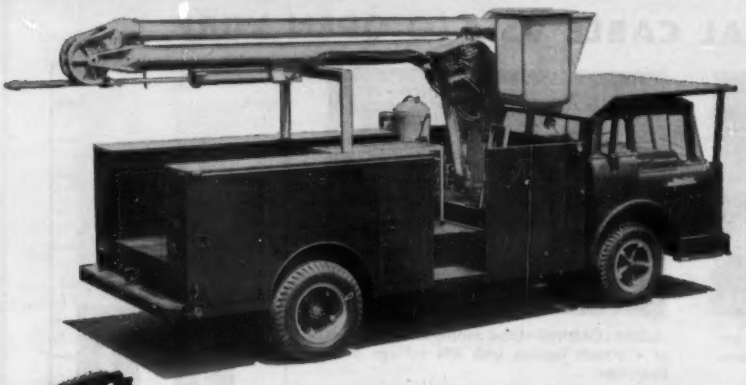
TRANSFORMER TANKS to Specification

Shaw-Perkins Cooling Radiators are available in a complete range of sizes and models, to give any make and capacity of transformer all the efficiencies of thermosiphon self-cooling. They feature full length oval tubes for optimum heat dissipation, free flow. Flanges, elbows, valves, and other accessories available for any mounting condition.

Transformer tanks, another specialized Shaw-Perkins service to the industry, are engineered and built to customer specification, from pole mounted distribution types to power transformer types up to 3750 KVA.

Write today for full information

SHAW-PERKINS
MANUFACTURING COMPANY
201 East Carson St · Pittsburgh 19, Pa.



NOW! UTILITY TRUCKS

... built by Ward LaFrance. Manufacturers of the famous Ward LaFrance Fire Engines.

- Custom built bodies
- Rugged steel cabinet body
- Plenty of compartment space
- Commercial or custom built chassis

Specially designed for light and power companies. Backed by 39 years of truck building experience . . . fire apparatus, military air crash trucks, wreckers and other special purpose vehicles. Write for information.

WARD LaFRANCE
TRUCK CORPORATION
GRAND CENTRAL AVENUE, ELMIRA, N.Y., TEL. 3-5631

TECHNICAL LITERATURE

NEMA STANDARDS PUBLICATIONS—The following standards publications have been issued by National Electrical Manufacturers Association, 155 E. 44th St, New York 17, N. Y., at the prices listed:

Electric House Heating, HE 1-1957, 50 cents.

Hydraulic Turbines, Governors and Accessory Equipment, HT 1-1957, $1.40.

Identification of Cut-Length Bare Arc-Welding Rods and Electrodes, EW 3-1957, 60 cents.

Straight-Cut Varnished Cotton Fabric, VF 1-1957 (black fabric), and VF 2-1957 (yellow fabric), 60 cents each.

ALUMINUM WELDING—ASTM and the American Welding Society have jointly issued the second edition of their specification for aluminum welding rods and bare electrodes. This edition features a simplified classification system using Aluminum Association numbers. Copies are available at 40¢ each from American Welding Society, 33 West 39th St, New York 18, N. Y.

ENGINEERING & DRAFTING AIDS—"Time Saving Tips for the Draftsman and Engineer" is the title of a 34-page booklet of shortcuts to speed drafting and computation work. The booklet is free. Copies can be obtained from Reader Service Div, Frederick Post Co, 3650 N. Avondale Ave, Chicago 18, Ill.

DRAFTING STANDARDS—A 100-p booklet published by The Aluminum Extruded Products Div of The Aluminum Association gives drafting standards for aluminum extruded and tubular products. It is illustrated with many drawings and contains a section of mathematical tables and formulas. New tolerance tables have also been added. Available from publishers, 420 Lexington Ave, New York 17, N. Y.

AIEE PUBLICATIONS—The following publications have been issued by the American Institute of Electrical Engineers, 33 W. 39th St, New York 18, N. Y. Where no price is indicated, publication is free.

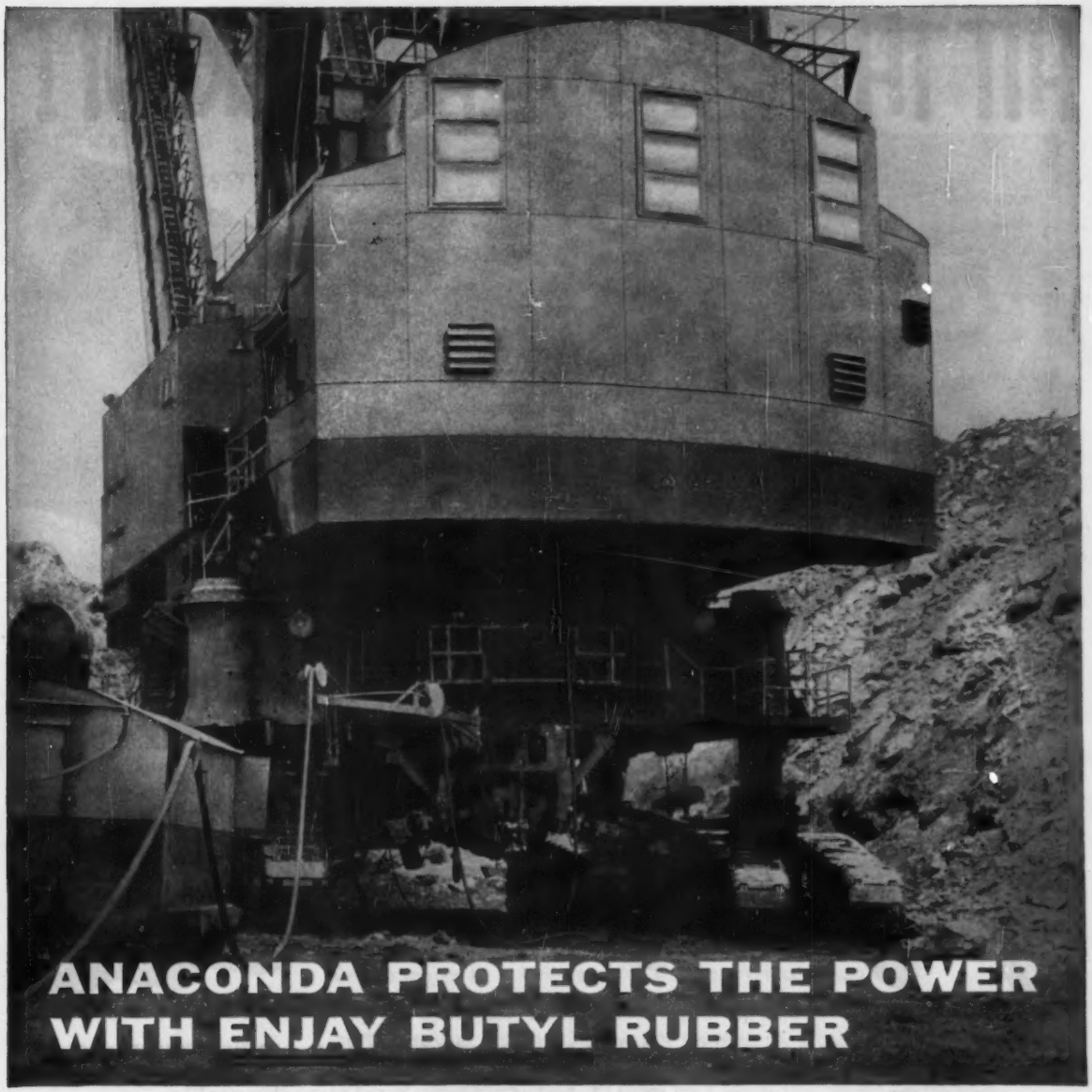
General Principles Upon Which Temperature Limits Are Based in the Rating of Electric Equipment. 22 pages; $0.80 (No. 1)

Guide for the Preparation of Test Procedures for the Thermal Evaluation of Electrical Insulating Materials. 8 pages. (No. 1D)

Guide for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electric Equipment. 7 pages. (No. 1E)

American Standard for Lightning Arresters for A-c Power Circuits. 16 pages; $0.60 (No. 28)

Proposed Guide for Determination of Short Circuit Characteristics of D-c Machinery. 8 pages. (No. 66)



ANACONDA PROTECTS THE POWER WITH ENJAY BUTYL RUBBER

Talk about impact resistance! The 5-year-old Anaconda cable supplying this giant shovel with power was buried under thousands of tons of rock when a whole wall of the open pit mine caved in . . . *yet the cable continued to supply power!* This is one of the many Anaconda products featuring Enjay Butyl for *outstanding* performance.

Enjay Butyl is *unmatched* in its resistance to impact and abrasion, moisture and weathering, ozone and corona . . . properties that make it the world's outstanding rubber value.

Low in cost and immediately available in a grade tailor-made for *your* electrical application, Enjay Butyl is *the* rubber to boost performance and cut costs. For further information, and for expert technical assistance, contact the Enjay Company.

ENJAY BUTYL

Enjay Butyl is the world's greatest rubber value . . . the super-durable rubber with *outstanding* resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

ENJAY *Pioneer in Petrochemicals*

ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y.

Akron • Boston • Chicago • Detroit • Los Angeles • New Orleans • Tulsa

HIT THE POWER JACKPOT!

CHASE VENTILATED SQUARE COPPER TUBE BUS

Those holes in Chase ventilated copper bus are like money in your pocket! Allow cooling air to circulate through the interior of this rugged conductor. Result? Lower operating temperatures that enable Chase ventilated bus to carry *20 per cent more current* than ordinary bus with the same dimensions!

This means you can use smaller bus to do your job and have a larger safety margin, too! Get all the facts on Chase copper buses. Write for free brochure.

Chase

BRASS & COPPER CO.

SUBSIDIARY OF KENNECOTT COPPER CORPORATION
WATERBURY 20, CONNECTICUT

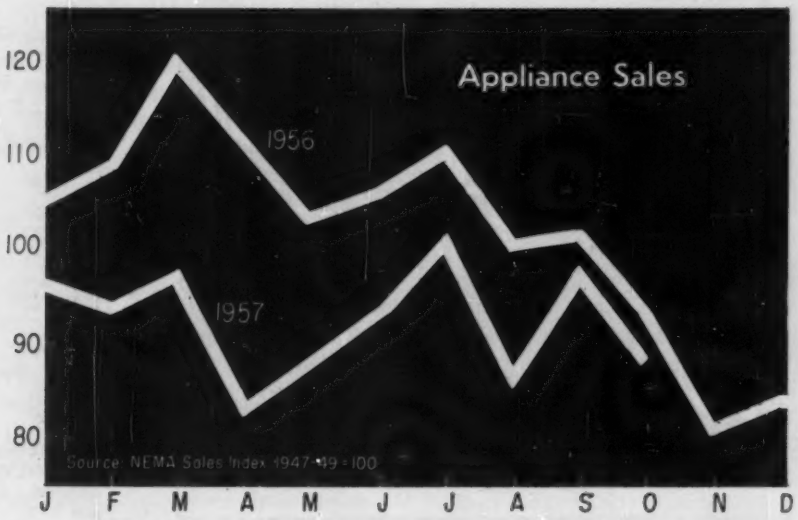
The Nation's Headquarters for Brass, Copper and Stainless Steel

Atlanta Baltimore Boston Charlotte Chicago Cincinnati Cleveland Dallas Denver Detroit Grand Rapids Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York (Maspeth, L.I.) Philadelphia Pittsburgh Providence Rochester St. Louis San Francisco Seattle Waterbury

CHASE ELECTRICAL CONDUCTORS
are available in a variety of shapes to suit every power-carrying need.

ELECTRICAL BUSINESS OUTLOOK

Electrical World
DECEMBER 30, 1957



Appliance Makers See an Upturn

Appliance manufacturers won't be sorry to see the old year out. All during 1957 appliance sales lagged '56 and, through October at least, the NEMA index of manufacturers' sales was unable to catch the corresponding '56 figures in any month. McGraw-Hill's Electrical Merchandising puts the year-to-year drop at about 6.5%, based on a recent survey of the manufacturers.

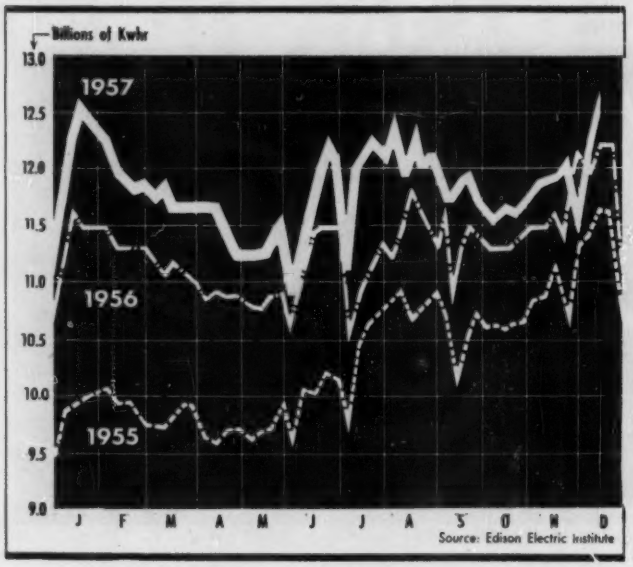
But appliance sales are headed for a 5% rise in 1958. According to manufacturers reporting to Electrical Merchandising, their sales will hit $8.3 billion—not far behind the 1956 record of $8.4 billion. They look for gains in all major appliances (except conventional washers), ranging from a 1% rise in standard electric ranges to a 52% leap for washer-dryer combinations.

Why the optimism? Heading into a year of adjustments, with unemployment on the rise and personal income not showing its usual gains, consumers could be expected to be a bit leery about increasing their outlays. And if there is a let-up in consumer buying, it's often hard goods that take it on the chin.

Relaxed credit isn't the answer. In spite of tight money, consumer debt owed on appliances was slightly higher through October of this year than it was in 1956. And it's hard to blame this year's disappointing performance on saturation either. Freezers, says Electrical Merchandising, have a bigger potential market today than they did when they first came out. At the start of 1946 there were 29 million electrified homes and no freezers. As 1958 opens, the U. S. has about 9 million freezers in use, but electric service has reached better than 48 million homes. While saturation has risen, the market has expanded 35%.

The bright spot for appliances is the expected upturn in building. If housing starts reach 1.05 million in 1958 and construction increases 5%, as predicted by the Dept of Commerce (EW, Dec. 16, 1957, p 153), appliance sales should get a shot in the arm. Not only would there be 70,000 more new homes to be stocked with appliances than there were in '57, but the increased rate of moving associated with a big construction year, which has tended to stimulate appliance sales in the past, may break through the consumer apathy that has been holding down appliance sales in 1957.

STATISTICS



OUTPUT

Not available for week ending December 21 because of Christmas Holiday. For week ending December 14, output was 12,570,000,000 kwhr—up 2.9%

Per Cent Change From Previous Year

	Nov. 30	Dec. 7	Dec. 14
Total U. S.	−3.8	+2.2	+2.9
New Eng.	−6.6	+2.9	+1.2
Mid. Atlan.	−4.6	+2.3	+2.3
Cent. Ind.	−7.2	+0.1	+0.0
West Cent.	−2.5	+1.6	+1.5
Southeast	−3.8	+4.8	+7.1
South Cent.	+4.7	+4.2	+5.8
Rocky Mount.	+1.8	+2.1	+2.8
Pacific			
NW	−1.9	−2.5	−2.3
SW	−2.0	+4.7	+5.9

Seasonally Adjusted Index 228.9
Week Ago 227.6
Year Ago 222.3

Atomic Energy Commission requirements—1,050,000,000 Kwhr (Electrical World estimate). Excluding AEC, output increase was 3.8%

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Sept.	126.24	125.75	118.66	6.4
Peak—Class 1 Systems (million kw)	June	104.6	97.8	97.2	7.6
Estimated Dec. '57 Peak (million kw)	Sept.	112.8	113.0	114.8	−1.8
Production—billion kwhr	Sept.	51.57	55.45	48.82	5.6
Hydro		9.28	10.03	8.96	3.6
Fuel		42.29	45.42	39.86	6.1
Sales—billion kwhr	Sept.	49.01	49.79	46.18	6.1
Residential		12.86	13.05	11.67	10.2
Commercial		8.59	8.76	7.82	9.8
Industrial		24.76	25.06	23.97	3.3
Other		2.80	2.93	2.71	3.3
Fuel Consumption	Sept.				
Coal—million tons		12.75	13.33	12.45	2.4
Oil—million barrels		5.64	5.79	5.20	8.5
Gas—billion cu ft		137.60	160.96	124.63	10.4
Net Income Class A & B Co's $—million	Sept.	116.13	108.86	108.33	7.2
Residential Customers—millions	12 mos	46.61	46.49	45.39	2.7
Revenue per kwhr	ended	2.57¢	2.57¢	2.61¢	−1.5
Avg kwhr per customer	Sept. 30	3,121	3,104	2,929	6.6
Avg annual bill		$80.21	$79.77	$76.45	4.9

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	Nov.	141	145	147	−4.1
ENR Construction Cost	Dec.	154.7	154.6	147.6	4.8
BLS Cost-of-Living	Oct.	121.1	121.1	117.7	2.9
New Orders for Machinery (1950 = 100)	Oct.	119	141	139	−14.4
NEMA Sales					
Insulation materials	Oct.	133	135	163	−18.4
Electric appliances		88	97	94	−6.4
Wholesale prices	Oct.				
Motors and generators		143.0	143.3	136.9	4.5
Transformers and regulators		150.8	150.8	144.8	4.1
Switchgear and fuses		170.9	170.6	161.9	5.6
GNP—annual rate—$ billion	3d qtr.	439.0	434.3	416.7	5.4

MANAGEMENT BULLETIN

FINANCE ▶ **Electric utility bond prices have been edging up fast.** The majority of those listed on the New York Stock Exchange are above or close to their 1957 high prices. Cincinnati Gas & Electric's 4⅛'s of 1987 made a recent spurt of 6¼ points in a day to close at 103¾ as compared with its old high of 98½. Union Electric's 2¾'s of 1975 jumped 6 points to 87. Other bonds going over their 1957 highs were: Alabama Power's 3½'s of 1972; Central New York Power's 3's of 1974; Dayton Power & Light's 2¾'s of 1975; and Philadelphia Electric's 2¾'s of 1967. Utility bonds listed on the American Stock Exchange also registered higher prices. Southern California Edison's 4½'s of 1982 went into high grounds recently when it hit 104¼ as compared with the former high of 103¼. Another one was Public Service Electric & Gas Co's 6's of 1998 which jumped five points in one day recently. It closed at 130 as compared with the 1957 high of 136.

"Statistics of Electric Utilities in the U. S." has been issued by Federal Power Commission. For copy, write FPC, Washington 25, D. C. The order number is FPC-S-128; the cost, $6 a copy.

Latest quarterly common stock increases are: Atlantic City Electric Co from 32½¢ a share to 35¢; St. Joseph Light & Power Co from 35¢ to 37½¢; Citizens Utilities Co from a 3% stock dividend to 3.5%; Florida Power Corp from 45¢ to 50¢; and Carolina Power & Light Co from 30¢ to 33¢.

REGULATION ▶ **Missouri's Supreme Court recently handed down an opinion** that has the effect of directing the state Public Service Commission to revise its rate-making formula. The PSC will have to consider current inflationary trends in establishing valuations.

The high state court reversed and remanded a ruling by Circuit Judge Sam C. Blair of Jefferson City. He had upheld the PSC's finding in a rate increase case instituted by Missouri Water Co as applied to its customers in Independence.

Written by Judge Frank Hollingsworth, and concurred in by all judges of Division I, the opinion ordered the case referred back to the Missouri commission.

Missouri Water had originally asked the PSC to approve an upward revision of its Independence rate to produce additional revenues estimated at $252,414. After the PSC authorized an increase of $167,204, the company appealed, first to the Cole County Circuit Court and then to the State Supreme Court.

In reversing the lower court ruling, Judge Hollingsworth wrote: "The decreased purchasing power of the American dollar, especially since the close of World War II, is a matter of common knowledge to owners and users of property and consumer goods and services. Courts also know these facts and give such consideration to them as, in justice, they should."

Although it did not lay down any specific formula for the Missouri commission to follow, the high court pointed out that in the Independence case the commission had excluded from consideration the evidence relating to the company's present fair value.

The opinion said that a fair value should not be based primarily on either original cost of the property or the cost of reproducing it new. It said the court should not circumscribe regulatory agencies by hard and fast formulas, but that each case should be determined on its own facts and merits.

MEETING ▶ **National Association of Railroad & Utilities Commissioners cancels location of its 1958 annual convention.** It was originally scheduled for the Atlanta-Biltmore Hotel, Atlanta, Ga., on Nov. 17-21. A new time and place will be decided by the executive committee of NARUC at its winter meeting in Washington, D. C., on Feb. 13.

TAXATION ▶ **New Hampshire Supreme Court annuls utility franchise tax.** Public Service Co of New Hampshire first challenged the tax in 1954 after the State Tax Commission ordered a sharp increase in the rate. Six companies are to receive $1,358,220 of which PS of NH is to get $990,552. Court held that while it is proper for the state to tax utility's franchise, the formula upon which the existing tax is based is unconstitutional because it is considered disproportionate discriminatory.

Said Justice J. Lampron: The existing formula has "no economic significance. The reason is that the rate of return is a composite of the cost of three components of capital, bonds, preferred stock, and equity, and the capitalization of the equity earnings, which are by far the most costly (10%) at the rate of return (5.65%) which is little more than half of the cost component of the common stock, is illogical and unjust. The rate of return is fixed for the investment as a whole, including bonds and preferred stock, hence, capitalization of equity earnings alone at that overall rate cannot be a sound measure of the franchise value."

Said Gov. Lane Dwinell: Action throws the State's biennial budget out of balance by more than $2.5 million. He indicated a special state legislative session would be called soon. Levy has brought in more than $500,000 a year.

Said PS of NH Pres A. R. Schiller: "Naturally we are pleased with the outcome. We protested the franchise tax after it had been increased arbitrarily to such a level that we had no choice but to test the matter in court before passing all of it along to our customers through electric rates."

EMPLOYEE RELATIONS ▶ **"Many people feel that if they speak or write, they are communicating,"** warns Charles E. St. Thomas, manager, marketing services division, General Electric Co, in the December issue of "Manage Magazine." You don't communicate, he continued, "until the person understands what you are trying to communicate." He suggests the following for a good communications program:

- **Set specific objectives.** What is it we hope to create an understanding of in a particular communications situation?
- **Audience.** Who is it we are really trying to reach? Is there a secondary audience?
- **Message.** What is it that we are really attempting to get across?
- **Timing.** When is the best time to create understanding? For instance, do we announce a sales plan just prior to vacation?
- **Climate.** What is the feeling? If unfavorable, should effort be concentrated first to eliminate or minimize roadblocks so the message will be received without pre-established mental blocks?
- **Media.** What is the most effective and economical?
- **Channels.** Do we take the single-channel approach, or do we adopt a multiple-channel approach?

PUBLIC RELATIONS ▶ **Pennsylvania Power & Light Co has issued a booklet entitled "PP&L Fact Finder."** It gives in a nutshell essential information on the company (such as history, statistics on revenues, expenses, population, sales, customers). It also has an "Industry Facts" section. For copy, write W. H. Rodgers, Jr, advertising and publicity manager, Allentown, Pa.

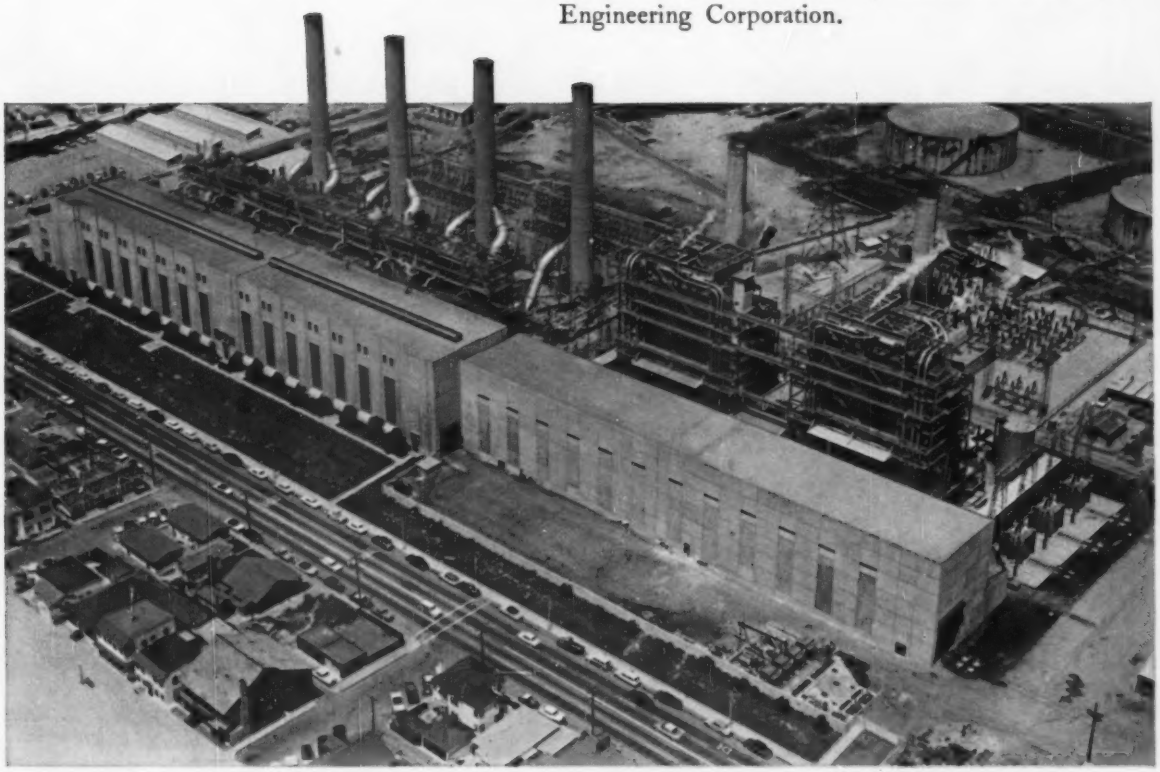
A series of ads has just been prepared by the California Electric Power Co directed towards interesting the pre-engineering student, the graduate electrical engineer, and the electrical engineer in the electric utility industry. For copies, write Lester Healy, advertising manager, Riverside, Calif.

RETURN TO REDONDO

Unit #6 of the Redondo Steam Station of the Southern California Edison Company went into commercial operation less than 22 months from the time Stone & Webster Engineering Corporation received authorization to proceed with design and construction.

This unit with a capacity of over 150,000 kw was designed to operate on gas and/or oil. Complete remote controlled furnace ignition and combustion control permits firing of Units #5 and #6 by either fuel from a centralized control room.

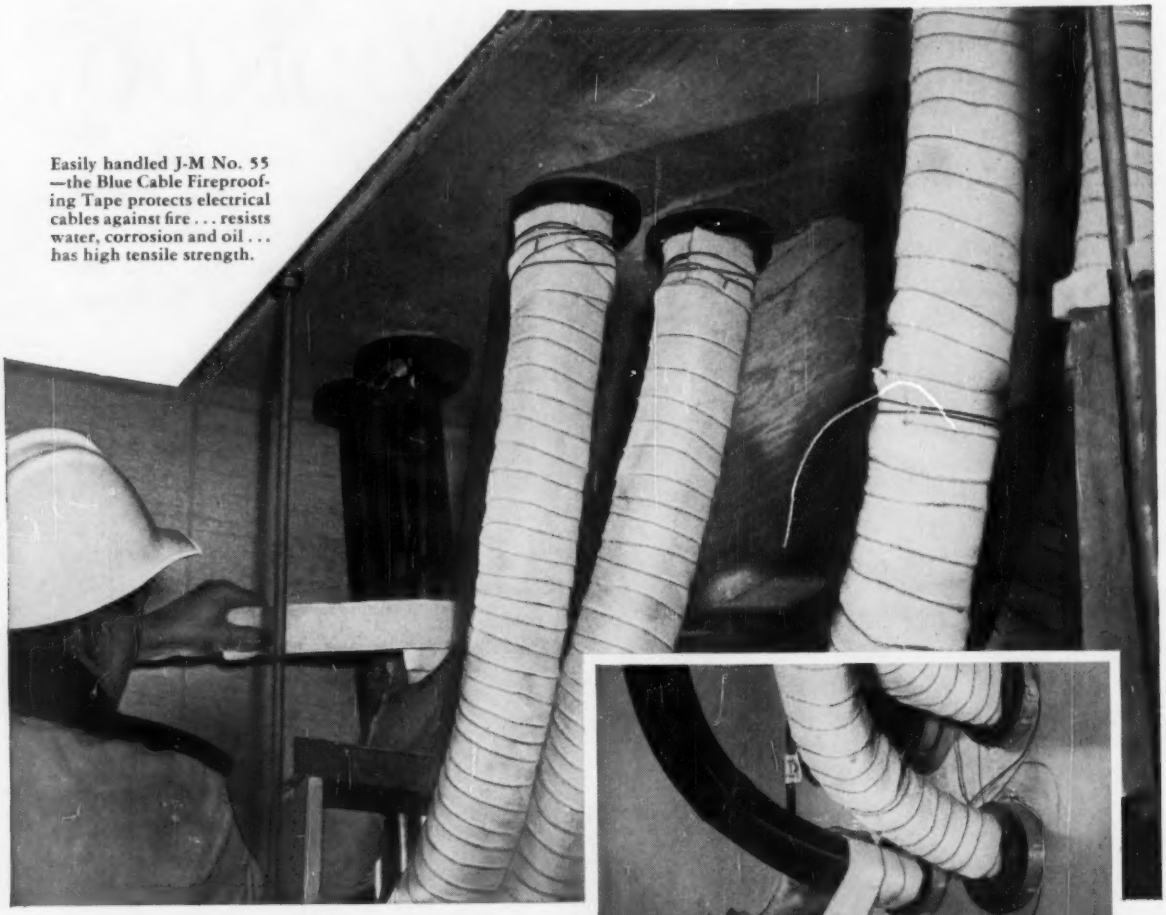
A second control room serves Units #1 through #4 in a similar manner. Together they permit effortless operation over a wide range of load at minimum operating cost. All six units were designed and constructed by Stone & Webster Engineering Corporation.



Write or call us for information as to how our experience may be of assistance to you.

STONE & WEBSTER ENGINEERING CORPORATION
A SUBSIDIARY *of* STONE & WEBSTER, INC.

New York Boston Chicago Pittsburgh Houston San Francisco Los Angeles Seattle Toronto



Easily handled J-M No. 55 —the Blue Cable Fireproofing Tape protects electrical cables against fire . . . resists water, corrosion and oil . . . has high tensile strength.

Photos courtesy of Lone Star Cement Co., Dallas, Texas

ELECTRICAL CABLES . . .

Fireproofed quickly...to last!

with J-M No. 55 Asbestos Cable Fireproofing Tape

Here is the effective, time-saving fireproofing for electrical cables . . . designed for lasting protection.

Made of asbestos, Johns-Manville No. 55 Cable Fireproofing Tape offers many outstanding advantages. It will not support combustion; repels water, resists flame, fungus, mold, corrosion and oil. Explosive or toxic gases will not develop under arc. High tensile strength is maintained even after burnout.

In addition, No. 55—the Blue Cable Fireproofing Tape is impregnated with a silicone material that provides low water absorption and high moisture repellence. Thus, damage from ground water, flooding, fog or humidity is minimized. Selvedged edges prevent threads from pulling out and weakening the tape. There are no ragged, unimpregnated edges through which ground water can penetrate.

J-M No. 55 Cable Fireproofing Tape is simple to apply, even in confined spaces. It won't droop, sag, or unravel . . . assures a tight, lasting wrap. Furnished in widths from 1" to 3" in 25- or 100-foot rolls, it is easy to handle and stock.

For complete information on J-M No. 55 Cable Fireproofing Tape, write to Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

Johns-Manville ASBESTOS TEXTILES

JOHNS-MANVILLE JM PRODUCTS

Sporn Cuts Cake Marking Regulator Silver Anniversary

Philip Sporn, president of American Gas & Electric Co, cut the "regulator cake" in commemorating the 25th anniversary of the step-voltage regulator last month. He was joined by Raymond W. Smith, general manager of Transformer Division, General Electric Co, Pittsfield.

Sporn suggested that General Electric develop such a regulator. The first unit was installed (EW, July 22, 1957, p 142) near Roanoke, Va., on the lines of Appalachian Electric Power Co, now part of the American Gas & Electric system. This regulator is rated 50-amp, 1,080-kva, 3-phase, 6,900/12,000 Y-v, and has four 2½% taps above and below the nominal 12,500-v position. This unit has a load tap changer driven by a motor and controlled by a device to sense variations in line voltage.

RCA Ships Transistorized Freq.-Shift Tone System

Initial shipments were made by Radio Corp of America last month to three utilities of a new type of transistorized, high-speed, frequency-shift tone system for use with microwave and wire links. These units are expected to overcome many problems involved in transfertrip relaying of complex transmission networks.

The system transmits and receives trip information within 8 to 12 millisec. It uses frequency-shift signaling in which the transmission of one of two precise tones causes the desired function to take place. Presence or absence of both tones actuates fail-safe circuits to prevent false operation.

Designers point out that transistorized circuits combined with supervised guard signals give this high-speed tone system, when used with microwave, a degree of reliability that now meets the exacting requirements of transfer-trip relaying. Moreover, as transmitted trip signals may be received by more than one receiver, the new system may be used to protect complicated transmission systems such as three-terminal networks. On such networks sensing and clearing of line faults in less than 100 millisec is desirable. Ability to transmit and receive a trip signal in as little as 8 millisec contributes a minimum of delay to the sensing procedure.

Coupled with compatible microwave the new scheme, called Tru-Trip, may be extensively expanded by using translator units. With these devices tone channels in groups of four can be added to the system by translating basic channels to higher frequencies. Translators may be added to accommodate frequencies up to 120 kc, thereby allowing the system to be expanded to 44 channels.

The transistorized system has a low battery drain—about 100 ma for a receiver, 50 ma for a transmitter. It can operate on a 130-v station battery.

Westinghouse Reports on Developments

Recent developments at Westinghouse Electric Corp include the following:

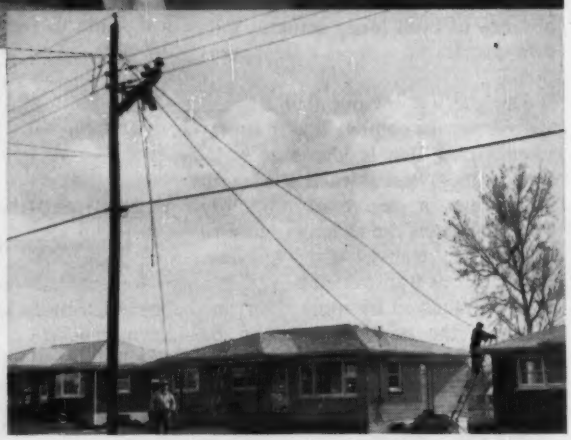
• Full production of switchgear distribution apparatus will flow from a new plant in Bloomington, Ind., by late 1958. Limited capacitor production will start in January. The 290,000-sq-ft, one-story plant will produce also lightning arresters, cutouts and oil-type reclosers.

• Florida Power & Light Co ordered two 240,000-kw turbine-generators which will be the highest capacity machines in Florida. They are scheduled for delivery in 1960 and 1961, and will be installed at a new plant site near Port Everglades, Hollywood, Fla. The generators will have an "inner cooling" system which will bring the hydrogen gas coolant into closer contact with the copper conductors in rotating and stationary parts.

• Public Service Co of New Hampshire has ordered a 100,000-kw generator for a new power station 15 miles north of Manchester. Westinghouse will also supply a condenser and electrical equipment, bringing the total value to nearly $4 million. The station will go into operation in 1960.

• Utah Construction Co has ordered an 8,000-hp motor for a new $3.5 million "cutter-type" dredge. The motor will weigh nearly 94,000 lb, measure 12 ft high, 17 ft wide, and almost 20 ft long. It will have a service factor which could boost its power to 9,200 hp.

The Finest Products
Made with Aluminum
are made with
REYNOLDS ALUMINUM



Take Advantage of REYNOLDS 5005* ALUMINUM ALLOY in TRIPLEX CABLE

Reynolds low cost high strength 5005 Aluminum Alloy conductor as the bare neutral messenger makes Triplex much more attractive for service drops and secondary distribution.

The advantages of Triplex self-supporting cable over open wire installations are very well known . . . lower installation and operating costs . . . less hardware . . . neater appearance. Additional advantages are possible with Reynolds Triplex having 5005 Aluminum Alloy as the bare neutral messenger and EC aluminum as the phase conductors:

1. There is no premium price for 5005.
The cost per thousand feet for Triplex cable with a 5005 neutral is the same as that for equivalent Triplex cable with an ACSR neutral.

2. Compared with Triplex having an ACSR neutral . . .
Triplex with a 5005 neutral is easier to handle . . . simple to splice . . . dead-end devices develop full strength of the neutral. As there is no steel core wire, corrosion is minimized in contaminated atmospheres.

3. Compared with Triplex having an EC all-aluminum neutral . . .
Triplex with a 5005 neutral has higher strength . . . spans may be lengthened . . . fewer poles are required . . . greater clearances over roads, walks and buildings are possible.

Check into the savings—in materials, time, labor and maintenance—possible with Reynolds new 5005 Aluminum Alloy as the bare neutral messenger wire in Triplex Cable. Complete data on physical and electrical properties is available from Reynolds Distributors, the local Reynolds branch office, or write: *Reynolds Metals Company, P.O. Box 1800-EL, Louisville 1, Kentucky.*

*** 5005 is a new high strength all-aluminum alloy conductor developed by Reynolds. It compares with copper in sag . . . costs no more than ACSR. Write for brochure.**

REYNOLDS ALUMINUM

Watch Reynolds All-Family Television Program "DISNEYLAND", ABC-TV.

NEOPRENE TRIPLEX WITH 5005 ALLOY NEUTRAL COMMERCIAL SIZES

CODE WORD	EC Phase Conductors			5005 Bare Neutral Messenger				Complete Cable	
				Size					
	Size AWG	Stranding	Cover Thickness 64ths"	Circular Mil	EC Equiv. Size AWG	Stranding	Ult. Str. Lbs.	Approx. Weight Lbs. per 1000 ft.	Diam. Inches
Kaki-Carp	4	7 x .0772	4	48,840	4	7 x .0835	1421	220	0.71
Kench-Shad	2	7 x .0974	4	77,640	2	7 x .1053	2196	317	0.84
Kibe-Killifish	1/0	7 x .1228	5	123,550	1/0	7 x .1328	3444	506	1.05
Kazoo-Tuna	4	7 x .0772	4	30,700	6	7 x .0662	904	203	0.71
Kaki-Shark	2	7 x .0974	4	48,840	4	7 x .0835	1421	290	0.84
Kench-Bonefish	1/0	19 x .0745	5	77,640	2	7 x .1053	2196	450	1.06

POLYETHYLENE TRIPLEX WITH 5005 ALLOY NEUTRAL COMMERCIAL SIZES

CODE WORD	EC Phase Conductors			5005 Bare Neutral Messenger				Complete Cable	
				Size					
	Size AWG	Stranding	Cover Thickness 64ths"	Circular Mil	EC Equiv. Size AWG	Stranding	Ult. Str. Lbs.	Approx. Weight Lbs. per 1000 ft.	Diam. Inches
Kaki-Periwinkle	4	7 x .0772	3	48,840	4	7 x .0835	1421	165	0.65
Kench-Conch	2	7 x .0974	3	77,640	2	7 x .1053	2196	252	0.77
Kibe-Neritina	1/0	7 x .1228	4	123,550	1/0	7 x .1328	3444	412	0.99
Kazoo-Strombus	4	7 x .0772	3	30,700	6	7 x .0662	904	149	0.65
Kaki-Cockle	2	7 x .0974	3	48,840	4	7 x .0835	1421	224	0.77
Kaki-Gebia	2	7 x .0974	4	48,840	4	7 x .0835	1421	240	0.83
Kench-Janthina	1/0	7 x .1228	4	77,640	2	7 x .1053	2196	369	0.99

NOTE: These are representative sizes: for complete information on all available sizes call your nearest Reynolds office or write Reynolds Metals Co. (P.O. Box 1800-EL) Louisville 1, Kentucky.

MEETINGS CALENDAR

JANUARY

International Home Furnishings Market—Including Appliance Show, The Merchandising Mart, Chicago, Ill., Jan. 6-17.

Edison Electric Institute—Home Service Committee, Chicago, Ill., Jan. 8; 2nd Annual LBE National Women's Conference, Edgewater Beach Hotel, Chicago, Ill., Jan. 9-11; Industrial Relations Committee, Mayflower Hotel, Washington, D. C., Jan. 16-17; Dealer Coordination Committee, EEI Headquarters, New York City, Jan. 30-31.

Instrument Society of America—Boston Section, Yankee Instrument Fair & Symposium, Hotel Bradford, Boston, Mass., Jan. 14-15.

Southeastern Electric Exchange — Personnel Administration Section, Biltmore Hotel, Atlanta, Ga., Jan. 16-17.

New England Farm Electrification Institute—University of Massachusetts, Amherst, Mass., Jan. 22-24.

Public Utilities Advertising Association—Regional Meeting, San Francisco, Calif., Jan. 23-24.

Industrial Heating Equipment Association — Penn-Sheraton Hotel, Pittsburgh, Pa., Jan. 27-28.

American Society of Heating and Air-Conditioning Engineers—64th Annual Meeting, Penn-Sheraton Hotel, Pittsburgh, Pa., Jan. 27-29.

Home Improvement Products Show—Hotel Sherman, Chicago, Ill., Jan. 27-29.

Annual Doble Engineering Clients Conference—Sheraton-Plaza Hotel, Boston, Mass., Jan. 27-31.

Pennsylvania Electric Association—Engineering Section, Prime Movers and Structures & Hydraulic Committees joint meeting, Pocono Manor Inn, Pocono Manor, Pa., Jan. 30-31.

FEBRUARY

National Association of Purchasing Agents—Public Utility Buyers Group Mid-Winter Meetings, Sheraton Hotel, Philadelphia, Pa., Feb. 2-4.

National Rural Electric Cooperative Association—Annual Meeting, Memorial Auditorium, Dallas, Tex., Feb. 2-6.

Edison Electric Institute—Prime Movers Committee, Penn-Sheraton Hotel, Pittsburgh, Pa., Feb. 3-5; Industrial Electrification Heating Conference, Netherland Hilton Hotel, Cincinnati, Ohio, Feb. 3-6; Industrial Power & Heating Group, Netherland Hilton Hotel, Cincinnati, Ohio, Feb. 6-7; EEI-AGA 1958 Conference Final Planning Meetings, Ben Franklin Hotel, Philadelphia, Pa., Feb. 6-7; Electrical Equipment Committee, Dayton Biltmore Hotel, Dayton, Ohio, Feb. 10-11; Transmission & Distribution Committee, Lord Baltimore Hotel, Baltimore, Md., Feb. 11-12; Meter & Service Committee, Sheraton Hotel, Philadelphia, Pa., Feb. 17-19.

Industrial Electrification Council—National Industrial Heating Conference, Netherland Hilton Hotel, Cincinnati, Ohio, Feb. 3-6.

American Institute of Electrical Engineers—Winter General Meeting, Statler and Sheraton-McAlpin Hotels, New York City, Feb. 3-7.

Missouri Valley Electric Association—Industrial & Commercial Sales Conference, President Hotel, Kansas City, Missouri, Feb. 6-7.

NATIONAL ELECTRICAL WEEK WILL BE OBSERVED FEBRUARY 9-15.

American Public Power Association—Engineering & Workshop Meetings, Chattanooga, Tenn., Feb. 13-14.

Pennsylvania Electric Association—Relay Committee Winter Meeting, Bellevue-Stratford Hotel, Philadelphia, Pa., Feb. 13-14; System Planning and Transmission & Distribution Committees joint meeting, Penn-Sheraton Hotel, Pittsburgh, Pa., Feb. 20-21; Electrical Equipment Committee Winter Meeting, Hotel Roosevelt, Pittsburgh, Pa., Feb. 27-28.

National Society of Professional Engineers—Spring Meeting, Michigan State University, East Lansing, Mich., Feb. 13-15.

American Institute of Mining, Metallurgical, and Petroleum Engineers—Annual Meeting, Hotel Statler, New York City, Feb. 16-20.

National Wiring Sales Conference — Statler Hotel, Detroit, Michigan., Feb. 20-21.

MARCH

Southern Safety Conference, Inc—Exposition, Peabody Hotel, Memphis, Tenn., March 2-4.

• **Pacific Coast Electrical Association**—Business Development Section, Statler Hotel, Los Angeles, Calif., March 6-7; Engineering & Operations Section, Sheraton Palace, San Francisco, Calif., March 27-28.

Lighting Lamps and Electrical Manufacturers Salesmen's Association—First National Lighting Exposition, Coliseum, New York City, March 9-12.

Nuclear Congress—Co-sponsored by American Society of Mechanical Engineers and the Engineers Joint Council, International Amphitheater, Chicago, Ill., March 16-22.

National Association of Corrosion Engineers—Annual Conference & Exhibition, Municipal Auditorium, San Francisco, Calif., March 17-21.

American Society of Mechanical Engineers—Management Conference Committee, Hotel Somerset, Boston, Mass., March 19-20.

Edison Electric Institute—Industrial Relations Committee, Headquarters, New York City, March 20; Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill., March 24-27.

Institute of Radio Engineers—National Convention, Waldorf-Astoria Hotel and New York Coliseum, New York City, March 24-27.

American Power Conference—20th Anniversary Meeting, Sherman Hotel, Chicago, Ill., March 26-28.

Southeastern Electric Exchange—Annual Meeting, Boca Raton Hotel and Club, Boca Raton, Fla., March 31-April 2.

MORE BIG DATES FOR '58

American Public Power Association—Annual Meeting, New Orleans, May 6-8.

National Association of Purchasing Agents—Annual Convention, Chicago, May 11-14.

Edison Electric Institute—26th Annual Convention, Boston, June 9-12.

American Institute of Electrical Engineers—Summer General Meeting, Buffalo, June 22-27.

National Electrical Manufacturers Association—Annual Meeting, Atlantic City, Nov. 10-14.

Engineers: Holmes & Narver, Inc.
Los Angeles, Cal.

Contractor: Newbery Electric Corp
Los Angeles, Cal.

22 Acres of Custom-Engineered Lighting by HOLOPHANE

In the great new Douglas Aircraft Plant at Long Beach, California, you can see clearly for more than 1000 feet—with a high degree of visual comfort....Reason: the lighting is produced by 5767 Holophane Prismatic HIBAY* reflectors...to our knowledge, the greatest accumulation of controlled illumination under one roof!

Holophane luminaires had been used by Douglas for many years ...The decision to install them in this new plant was another endorsement of Holophane lighting superiority.

Through research and development Holophane engineers are discovering new and better methods to meet the lighting problems of the nation's expanding industries. Chances are, they can help solve your problems, too. You may consult Holophane, through architects and engineers, without obligation.

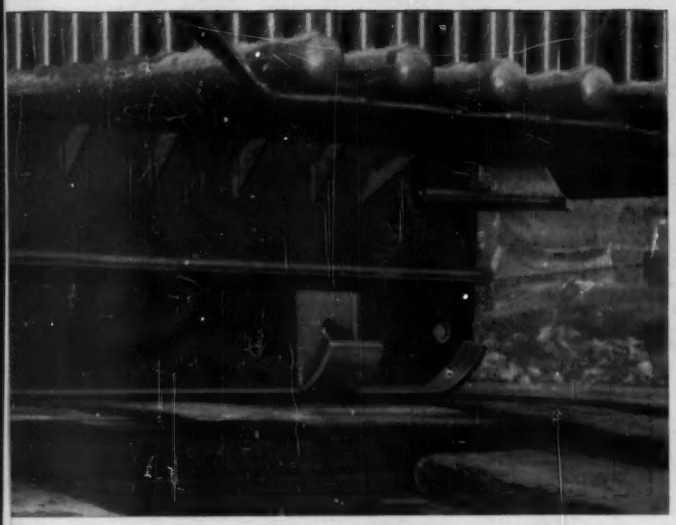
*®

Typical Holophane HIBAY Reflector

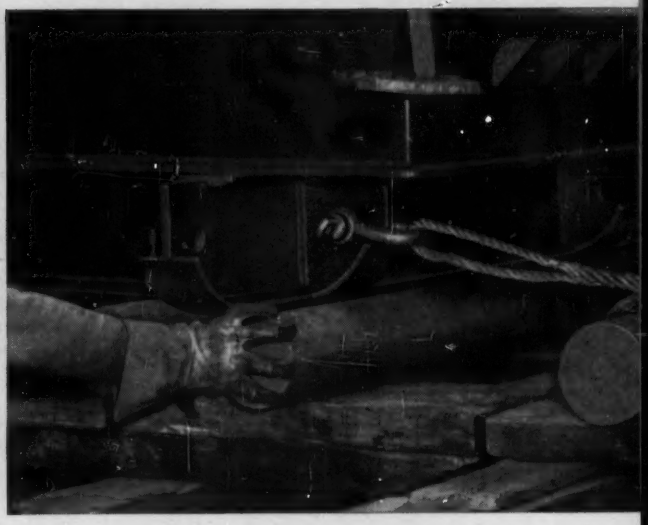
To be sure of quality in Reflectors look for the name HOLOPHANE impressed on each piece.

Holophane

HOLOPHANE
COMPANY, INC. • *Lighting Authorities Since 1898*
342 Madison Ave., New York 17, N.Y.
THE HOLOPHANE CO., LTD., 418 KIPLING AVE., SO., TORONTO 14, ONTARIO



The 4-way sled-runner base facilitates positioning this Westinghouse standardized substation transformer for unloading at Detroit Edison Co., Carpenter Substation.



The 4-way sled-runner base carries the transformer smoothly and easily to the installation point without bumping or biting into the wooden rollers.

THE DETROIT EDISON COMPANY REPORTS . . .

Easier, safer moving and installation of Westinghouse standardized substation transformers with sled-runner bases

"Handling this 5,000-kva Westinghouse substation transformer during unloading and installation was greatly simplified by its four-way sled-runner base," according to a recent statement from The Detroit Edison Company.

"The eyeholes for attaching towing cables with a standard clevis cut time and trouble from the handling. The four-way runners had a special advantage when the transformer had to be turned . . . additional cables could be attached and the unit slewed around in a smaller space."

Another advantage noted was the elimination of digging into the wooden rollers because of the cast-steel shoes welded to the I-beam base and wider flanged base construction which affords generous bearing surfaces.

This base provides rigid support for the bottom of the transformer tank, protecting it during movement of the unit. It also protects valves and other projections against damage from accidental blows.

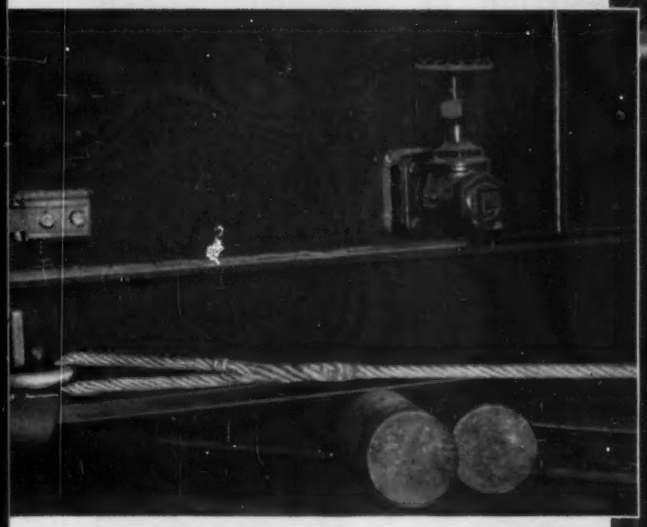
Stability is provided by this base, too. It is so constructed that the safe angle of tilt is at least 15° from the horizontal.

Jacking facilities are provided at the corners of the tank, in accordance with ASA standard requirements.

All Westinghouse standardized substation transformers are equipped with four-way sled-runner base.

J-70832

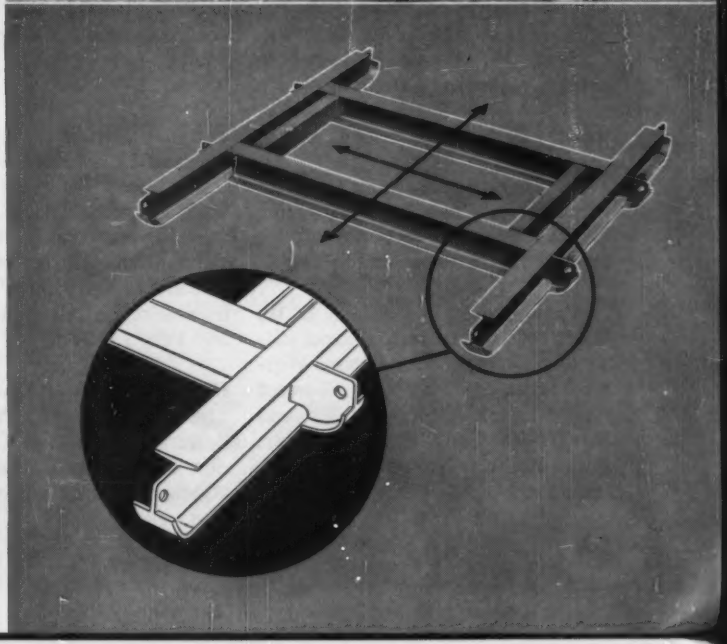
YOU CAN BE SURE.. IF IT'S



Cables can be inserted for pulling or restraining in any of the eight eyeholes in the 4-way sled-runner base. This facilitates accurate positioning of the transformer.

This 5000-kva Westinghouse standardized substation transformer is being moved into installation position. This is a 3-phase, Class OA, Type SL transformer with a rating of 24,000/41,570 wye, 4800 volts.

The 4-way sled-runner base permits this 22-ton transformer to be moved forward, backward or to either side.



Westinghouse

French Heads GSU Purchasing

JOHN P. FRENCH

John P. French, purchasing agent for Gulf States Utilities Co, was recently named director of purchasing for the utility. He succeeds the late Jack R. Orrick.

In his new position, French is responsible for all company purchases. The operations of GSU's two purchasing departments in Beaumont and Baton Rouge are also directly under his supervision.

French, who started in the company's storeroom in 1926, has since held various positions of increasing responsibility in the purchasing department. He has been purchasing agent since 1949.

Paceco Ups Ramsden

C. D. Ramsden is the new president and general manager of Pacific Coast Engineering Co, California. Ramsden has been vice president and general manager since 1956 and a director since 1948.

Since joining Paceco in 1946 as chief engineer, he has directed equipment design and fabrication for Columbia River and St. Lawrence River hydroelectric projects and almost every atomic project of the AEC.

PERSONAL BRIEFS

Richard L. Jacobsen will succeed **Thomas W. Hughes** as Sheridan Division manager for Montana-Dakota Utilities Co upon the latter's retirement on March 31, 1958 . . . **Carlysle W. Woodruff** has been named supervisor of transmission lines for Gulf States Utilities Co, succeeding **A. C. Henderson,** retired.

Wilmot O. Smith, assistant vice president at Long Island Lighting Co, has been given responsibility for gas and electric sales, starting Jan. 1.

At Pacific Power & Light Co, **D. W. Harris** has been named Casper district manager; **A. A. Peters,** Worland district manager; **Howard Lusch,** Lovell district manager; and **Roy White,** Cody district manager. **Frank Reis** was named general sales manager.

Donald D. Schulz has been chosen as superintendent of Pennsylvania Power & Light Co's proposed Brunner Island power plant. He is succeeded as assistant superintendent of Martins Creek plant by **T. Theodore Torok.**

Potomac Edison Co has appointed **Garland L. Johnston** to succeed retiring **Henry W. Price** as Cumberland district manager. Also promoted were **Walter T. Kline,** to Waynesboro district manager; and **Edward L. Ewald,** to Frostburg district manager. All changes are effective Feb. 1, 1958.

Howard G. Carter has been named superintendent of Puget Sound Power & Light Co's Central Division and **Eugene L. Bush** was made assistant to the executive VP.

A. U. Zimmerman has been appointed assistant to **E. E. Kime,** vice president-operations, in the San Francisco office of California-Pacific Utilities Co. **Earl A. Hanson** becomes Venicia Division manager.

California's Gov **Goodwin J. Knight** has announced plans to appoint **C. M. Gilliss** as Director of Public Works, effective Jan. 1, 1958 . . . **Richard H. Graham** has joined Atomic Energy Commission as technical secretary to its Advisory Committee on Reactor Safeguards.

Alabama Power Co has designated **Walter Baker** as staff assistant in the office of **E. A. Wilson,** general sales manager; and **Norman W. Mandy** as supervisor of rates and rate applications.

International Harvester Co's new executive vice president is **W. C. Schumacher.** He replaces **Frank W. Jenks,** now president.

Fluor Corp, Ltd, has named **Edward McNary** controller and assistant secretary . . . **William R. Cook** has been named wire mill superintendent of the Buffalo plant of Wickwire Spencer Steel Division, Colorado Fuel & Iron Corp.

International Business Machines Corp has elected **John J. Bricker** as vice president, and named **Ralph Harris, Jr,** as director of personnel. **George W. Woodsum** is new purchasing agent for the Rochester, Minn., plant, and **Herbert R. Keith** has been appointed director of marketing services.

M. A. Vreeland has been admitted as a partner in the firm of Sanderson & Porter . . . **John D. Swift,** formerly of Puget Sound Power & Light Co's Southern Division, has opened a consulting engineering office specializing in utility work at Olympia.

OBITUARY

W. H. Stueve, 72, noted electrical engineer and former chief power consultant and industrial development representative for Oklahoma Gas & Electric Co died suddenly after a heart attack.

Rome's lightweight Triplex goes up much faster than open-wire service drops

Reduce your service-drop installation time—even by a few minutes—and you save money. Now it's possible to speed up practically every job.

High dollar savings. Rome's aluminum Triplex can be installed much faster than open-wire service drops. Multiply the time it saves by the high cost of keeping your crew on the job, and you'll see how great the savings are in manpower costs alone.

Why such savings are possible. The lightweight construction of Rome's aluminum Triplex is behind these important savings. This single-cable assembly weighs less than conventional copper three-wire service drops, so it's easier to handle and quicker to install.

Rome's aluminum Triplex offers simplicity in construction. A self-supporting cable, it consists of specially insulated power conductors spiralled around a "straight-away" neutral conductor. Less handling is required to pull it off the truck, string it, and connect it than conventional three-wire service drops.

You can purchase this economical service drop cable in handy 500-foot cartons, paper-wrapped coils, or on non-returnable reels.

Specify Rome's aluminum Triplex for your next job. Contact your nearest Rome Cable representative for more information—or write to Department 366-B and ask for Bulletin RCP-361. Rome Cable Corporation, Rome, N. Y.

Plus these benefits!

Costs Less. Initial cost is lower than conventional copper Type SD service drop cable.

Lasts Longer. Maintenance and service interruptions are few compared to open-wire installations. It offers maximum resistance to storms, wind and ice loading.

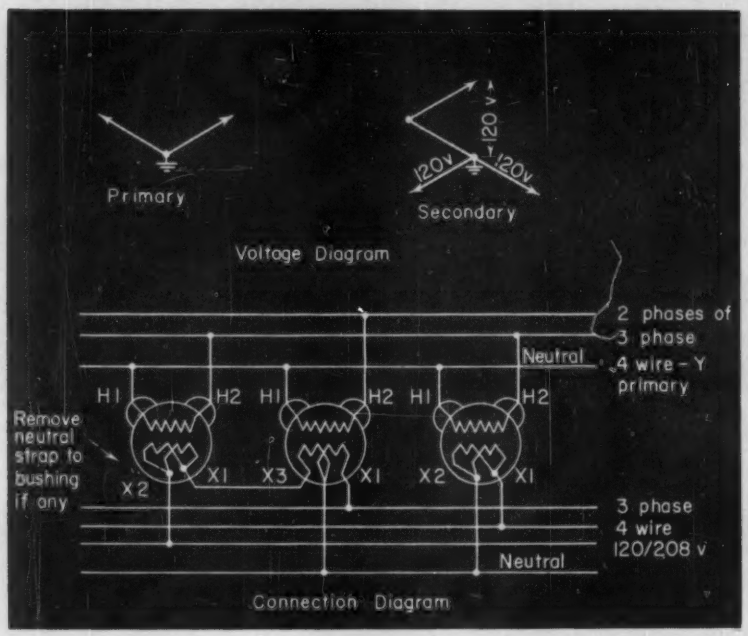
Fewer Poles Required. Fewer poles are required and longer spans are possible with mid-span taps on secondary Triplex.

Less Hardware Needed. Service tap connections at the pole require less hardware than a conventional three-wire tap.

ROME CABLE

CORPORATION

READERS FORUM



120/208V Available from 2 Transformers

To the Editor:

Referring to the article "Two Phases Can Supply 4-Wire 120/208V" by H. S. Lewis, page 95, November 18, 1957 issue of Electrical World, . . . it is also possible to provide 120/208V, three-phase, 4-wire service with only two transformers, Fig 1, instead of the three used by Mr. Lewis.

Dale Langs
Teletype Corporation, Chicago

Don't Get Worried If You Happen To Be 55

To the Editor:

I like the article in the November 25 issue of the "Electrical World" "How Con Edison Helps Its Employee Find a Happy Retirement." There was an error in the third paragraph from the end of the article. The last sentence of this article states "At the age of 55 only three out of five people will live ten years longer." The correct statement should have said "At the age of 55 only three out of five people will be on the payroll eligible to receive an age retirement." By way of explanation, of the two people who will not be on the payroll to receive age retirement less than one will have died and more than one will have retired for disability. In addition a very small fraction will have resigned.

This statement was based on a study of 510 male employees who were in this company and all 55 years old in 1943. By 1953, 13 resigned, 75 died, and 98 retired for physical disability. This left 324 working and eligible for age retirement at 65.

It might be helpful if you will print this correction as I have already had two calls from our worried engineers who are 55 years old.

D. S. Sargent
Personnel Director
Consolidated Edison Co
4 Irving Place
New York 3, N. Y.

SALES ASSIGNMENTS

COMPANY STAFFS

General Electric Co's reorganized distribution arm for major appliances and TV receivers, known as the Sales and Distribution Dept, has named P. A. Tilley as general manager. W. C. Dance will be manager-Eastern districts, and R. C. Hawley will be manager-Western districts. Contact with independent distributors will be through L. G. Hertzler. The enlarged customer relations section, now transferred to the new component, is headed by C. W. Theleen. Commercial Service & Warehousing headed by J. A. Patterson, also will come under the new department as will Product Service, managed by J. H. Miller.

I-T-E Circuit Breaker Co's R&IE Equipment Division has made the following changes in the Greensburg (Pa.) sales department: Arthur W. Maas is newly appointed manager of industrial product sales. He replaces Howard Graybill, now manager of utility sales.

Philco Corp has appointed David Brody as general manager of Philco Distributors, Inc, Philadelphia.

Thor Power Tool Co has advanced William J. McGraw to general sales manager, Walter G. Mitchell to general manager of product development, and Milton E. Slater to sales manager of farm and ranch division. All are new posts. . . . Alfred W. Escoffier is new manager of the Seattle branch and R. J. Horrocks transfers to Denver to cover industrial sales in that area.

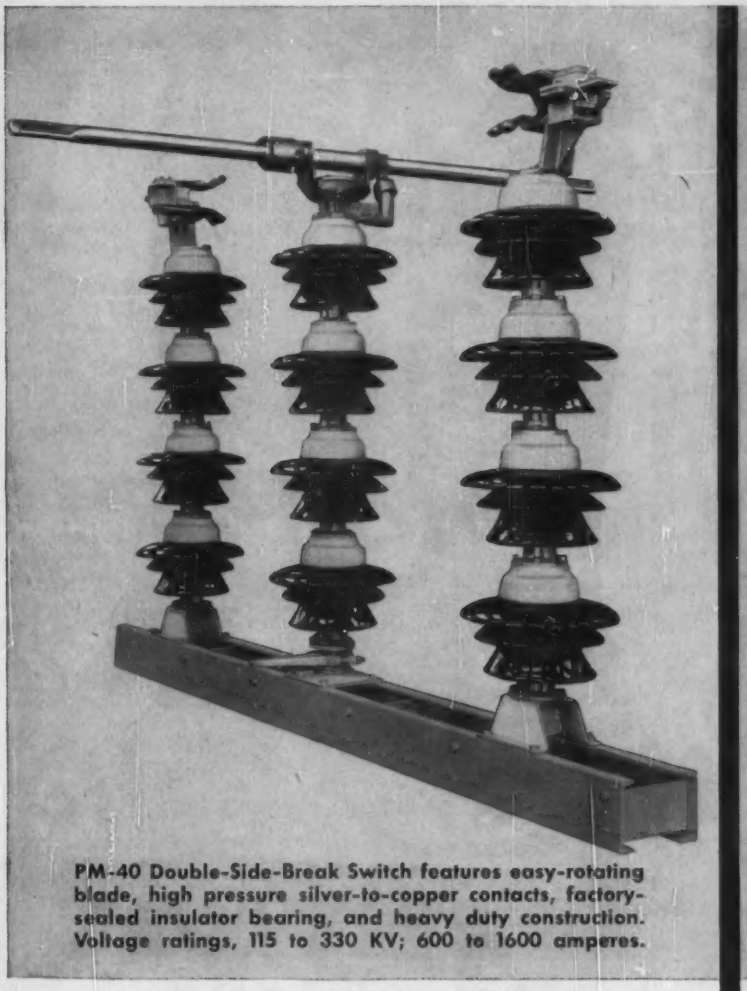
Wheeler Reflector Co has appointed the following sales representatives: Donald B. Rosequist, to cover Boston and North Shore areas; William E. Hurry, to cover Maine, New Hampshire, and Vermont; and Paul T. Smith, to cover southeastern Massachusetts and Rhode Island.

REPRESENTATIVES

Automatic Switch Co has appointed eight new authorized stocking distributors of Asco Solenoid valves. They are: Butler & Land, of Dallas, Tex., and Shreveport, La.; Connecticut Plumbing Supply Co, Stamford, Conn.; Electric Sales & Engineering Co, Milwaukee, Wisc.; Fischer Industrial Equipment Co, Cincinnati, Ohio; Park City Supply Co, Bridgeport, Conn.; Standard Electric Sales, Seattle, Wash.; Sterns Electric Equipment Co, Buffalo, N. Y.; and Textile Mill Supply Co, Charlotte, N. C.

Memco Engineering & Mfg Co, Inc, has named two new sales representatives. J. R. A. Hobson will handle Virginia and West Virginia, and R. S. Terhune Associates will cover the Chicago-Milwaukee sales area.

Page & Hill, Inc, has appointed Perry R. Pennington to represent the firm in the sale of Western red cedar and Douglas fir poles in southern Wisconsin, Illinois, and Indiana.



PM-40 Double-Side-Break Switch features easy-rotating blade, high pressure silver-to-copper contacts, factory-sealed insulator bearing, and heavy duty construction. Voltage ratings, 115 to 330 KV; 600 to 1600 amperes.

In opening position, PM-40 Switch blade rotates on axis to relieve contact pressure.

In closing position, PM-40 Switch blade moves from 45° to 90° angle to lock easily and securely.

Here's easy, positive operation with Delta-Star's PM-40 Side-Break Switches

The ease of operating Delta-Star's PM-40 Double-Side-Break starts with its engineered simplicity. The rotating blade operates by over-toggle mechanism on a center rotating insulator. Balanced spring arrangement reduces operating effort when switch is opened or closed.

The simplified blade-actuating mechanism exerts enough power to easily break ice or corrosive formations—assuring ease of operation at all times.

PM-40 contacts are straight-line current path design with no offset to produce stress during fault currents. Tubular switch blade is one-piece, hard-drawn copper, with silver inlay contact points. The blade rotates on a factory-sealed, ball-bearing base.

Where you prefer or require side-break switches in voltage ratings of 115 to 330 KV, the Delta-Star PM-40 definitely deserves first choice consideration.

Call Delta-Star Electric Division,
H. K. Porter Company, Inc., Chicago 12, Illinois.
District offices in all principal cities.

H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION

Porter Divisions: Cleveland, Connors Steel, Delta-Star Electric, Henry Disston, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, W-S Fittings, H. K. Porter Company (Canada) Ltd.

Curtain call across the nation for Kuhlman's "Salesman of the Week"

Each of the men shown above was featured, sometime during our 1957 advertising, as the Kuhlman *"Salesman of the Week."*

Your response in identifying the Kuhlman representative familiar to you was more than gratifying both to these men and the Kuhlman organization.

Whether you personally participated in these identifications, or just noted the ads, the entire Kuhlman sales organization *"thanks you"*. . . and reaffirms their desire to serve you in the year ahead.

5723

KUHLMAN ELECTRIC COMPANY

GENERAL OFFICES: Birmingham, Michigan

PROFESSIONAL SERVICES

BLACK & VEATCH
Consulting Engineers
Electricity—Water—Sewage—Industry
Reports, Design, Supervision of Construction
Investigations, Valuations and Rates
1500 Meadow Lake Parkway
Kansas City 14, Missouri

M. W. KELLOGG
Piping System Flexibility Analyses
Unique model tester as well as modern digital computer facilities available for low cost, accurate flexibility analyses of the most complex piping systems.
The M. W. Kellogg Company
711 Third Ave., New York 17, N. Y.

THEODORE D. BROSS LINE CONSTRUCTION CORP.
Steel Tower & Wood Transmission Lines
Distribution & Maintenance
175 Endfield St. Hartford, Conn.

ELECTRICAL TESTING LABORATORIES, INC.
2 East End Ave. New York 21, N. Y.
Electrical, Electronic, Environmental, Photometric and Chemical Laboratories. Testing, Research, inspection and Certification.

PIONEER SERVICE & ENGINEERING CO.
Consulting and Design Engineers. Purchasing Specialists in Financing Accounting and other Operations
231 So. La Salle St. Chicago 4

COMMONWEALTH SERVICES INC.
Management and Business Consultants
200 Park Ave.
New York 22, N. Y.

ASSOCIATES INC.
Consulting and Design Engineers
200 E. Washington
Jackson, Michigan

HOOSIER ENGINEERING COMPANY
Erection and Maintenance of Electrical Transmission and Distribution Lines
1384 Holly Avenue, Columbus, Ohio

SARGENT & LUNDY
Engineers
140 South Dearborn St.
Chicago, Ill.

DAY & ZIMMERMANN, INC.
Engineers & Constructors
Transmission & Distribution Lines
Substations
Design & Construction
Reports - Valuations - Rates
Industrial & Utility
New York PHILADELPHIA Chicago

JENSEN, BOWEN & FARRELL
Engineers
Appraisals—Investigations—Depreciation Studies—Cost Trends—Reports
for Rate Cases, Security Issues, Regulatory and Accounting, Requirements
Original Cost and Continuing Property Record Determination
Ann Arbor, Michigan

TIPPETT & GEE
Consulting Engineers
Mechanical • Electrical • Thermodynamic
Structural Design • Studies • Supervision
Power Stations • Transmission • Distribution
Industrial Plants • Process
1333 North Second Street Abilene, Texas

SEARCHLIGHT SECTION

TRANSFORMERS

3—1000 KVA Penn 33000-2500/4330Y
3— 500 KVA W-H 33000-2400/4160Y
3— 500 KVA G-E 22000-2300/4000Y
3— 500 KVA W-H 13200-2300/3985Y
3— 333 KVA Mol 33000-7200/12470Y
3— 333 KVA W-H 13800-240/480
3— 333 KVA Mol 2300/4000Y-230x460
3— 250 KVA W-H 22000-7200/12470Y
3— 200 KVA A-Ch 34500-2400/7200
6— 150 KVA W-H 2400-120/240
4— 100 KVA W-H 22000-8900
6— 100 KVA Cent 13800-240/480
2— 20 KVA W-H Constant Current Regulators 2400/4160Y V. 6.6 amps.

Many other items in stock

TRANSFORMERS WANTED

Reliable rewind and repair service on all makes of transformers

THE ELECTRIC SERVICE CO.
5316 Hetzel St.
Cincinnati 27, Ohio
45 Years' Dependable Service

SUBSTATION EQUIPMENT

TRANSFORMERS

QU.	KVA	MFGR.	VOLTAGE
4	1667	Mol.	69,000–34,500
3	1000	G. E.	66,000–2300/4000
3	667	Kuhl.	66,000–480
1	200	West.	44,000–480
2	3000	Stand.	33,000–4160, 3 Ph.
4	1667	West.	34,500–7200, Inertaire
2	1500	G.E.	34,400–2520, 3 Ph.
3	1000	A.C.	34,650/11,550–2300
3	200	A.C.	34,500–2400/7200/12470Y
3	75	Wag.	33,000–240/480
1	3000	A.C.	23,380–2500/4330Y, 3 Ph.
3	2000	A.C.	26,400/13,200–2390/4140
3	1250	G.E.	26,400/13,200–2400/4150
2	1500	G.E.	23,000–2400/4800, 3 Ph.
3	100	G.E.	22,000–7200/12470Y
3	50	G.E.	22,000–2300
3	1667	G.E.	13,800–600
1	1000	G.E.	13,800–600, 3 Ph. Unit Sub.
1	600	Stand.	13,200–2300, 3 Ph.
1	450	Penna.	13,200–2400, 3 Ph. Askarel
3	125	A. C.	6900–2300
3	100	G.E	4800–120/240
3	50	Mol.	4160/7200–240/480
2	1500	G.E.	2300/4000–460
3	150	West.	2400–230/115
3	100	G.E.	2300/4000–230/460
1	100	G.E.	2300–575, 3 Ph.
6	50	West.	2400–114/228, Dry Type

FEEDER REGULATORS—Outdoor

1	250	A.C.	601 A. 2400 V. Ph. STEP
3	96	G.E.	200/400 A. 2400 V. 1 Ph IND.
8	36	West.	150/300 A. 2400 V. 1 Ph. IND.

SYNCHRONOUS CONDENSER

20,000 KVA, Whse., 13,800 V., 3 Ph. 60 Cy., 720 RPM

Also: FREQ. CHGRS., M-G SETS, SYN. CONDENSERS, OIL CIR. BRKRS., ETC.

BREW, WOLTMAN & CO., INC.
52 Church St. New York 7, N. Y.

WANTED
RELAY TEST ENGINEER

Excellent opportunity in relay test section of Massachusetts Utility. Good knowledge of electronics a necessity, E.E. degree helpful. Salary commensurate with experience. Write resume of experience, education, personal data, and salary requirements. All held in strict confidence.

Address **P-6899,** Electrical World
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

ELEC. UTILITY MANAGER

With 22 yrs utility experience, 17 in managerial capacity desires non political connection. Presently in charge of utility exceeding 30,000 KW load. Salary $15,000.

PW-6894, Electrical World
68 Post St., San Francisco 4, Calif.

GET CASH NOW

for your new surplus motors, controls and transformers!

NEW MOTORS AVAILABLE:

Over 5,000 new motors in stock, from ⅛ HP to 200 HP.

Special low prices.

Write, wire or phone collect!

AJAX ELECTRIC MOTOR CORP.
P.O. Box 262, Rochester, N.Y.
Long Distance Phone LD. 132

REPLIES (Box No.): Address to office nearest you c/o This publication Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

Electrical Sales Engineer—Excellent opportunity with firm of consulting management engineers located in Chicago for electrical engineer with some experience in contracting customers, selling through distributors or retailers or contacting or servicing utilities. Will work under direction of a vice president of company of leading electrical appliance and equipment manufacturer accounts. Will also contact top level officials in manufacturing and electric light and power companies. Travel required from fourth to third of the time. Salary depends upon man's age, qualifications, experience and potential. Send resume, with photo if possible, to Robb M. Winsborough, Vice Pres., Middle West Service Co., Consulting Management Engineers, 20 N. Wacker Dr., Chicago 6, Ill.

Electrical Engineer. Board layout work— power, lighting, and control systems; calculations; and occasional field contacts. Extremely wide variety of work with opportunity to enter consulting field and grow with progressive midwestern concern. All replies will be answered. P-6902, Electrical World.

Wanted: Southeast electric utility desires Electrical Engineer for work in distribution engineering. Prefer applicant to have had some experience. Pleasant working conditions. Within 100 miles of Gulf. Salary commensurate with ability, training. Number fringe benefits, opportunity for advancement. P-6912, Electrical World.

Rate Man wanted by utility operating in Southeast. Help design wholesale and retail rate structures. Assist with studies. Salary based on training, experience, and ability to produce. Challenging opportunity. Number fringe benefits, excellent working conditions. Write fully about training, experience, salary requirements. P-6923, Electrical World.

SELLING OPPORTUNITY OFFERED

Manufacturer's Representative Wanted by manufacturer of Pole Line Specialties, Rapidly expanding in Street Lighting materials. Must have contact with Utilities and Municipal power plants. West, Midwest and Southern States open. Send full details to Quigley Machine Products, 30966 Grand River Avenue, Farmington, Michigan.

Idaho Power Builds 100-mi Line From Brownlee to Boise

Biggest line on system to supply power from 360,400-kw Brownlee hydro project on Snake River

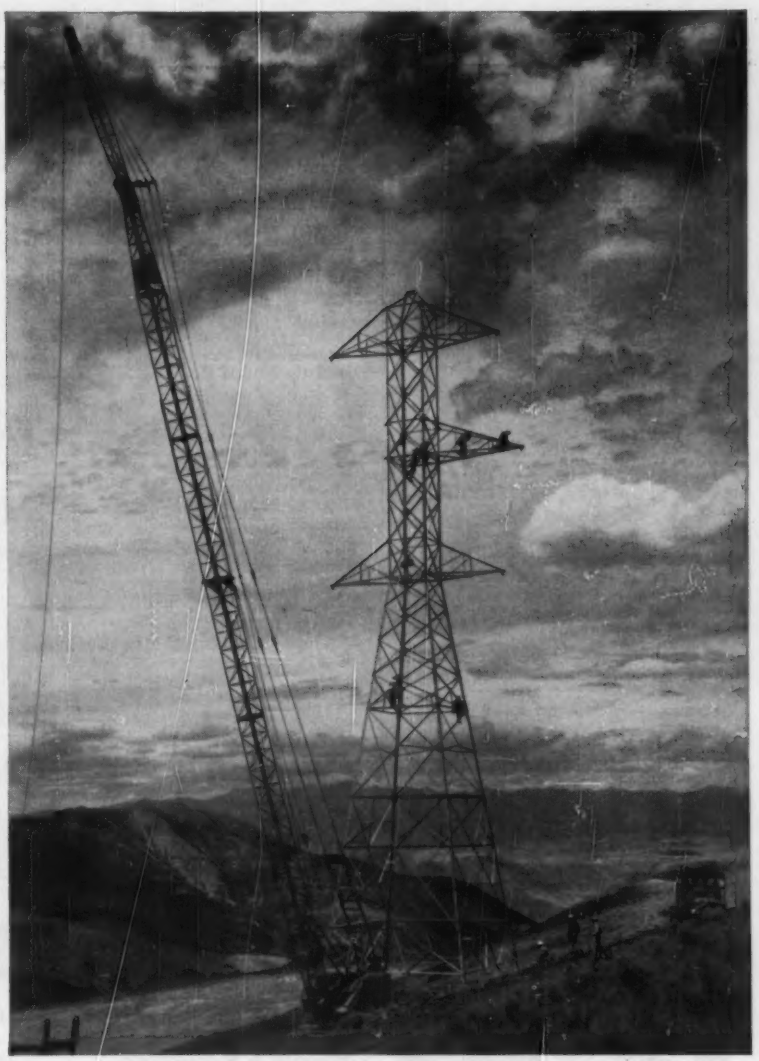
Early in 1957, with work on the Brownlee dam and power plant well under way, Idaho Power began construction of a whopping big transmission line. And big it has to be, to handle the impressive output of the huge turbines being installed at Brownlee. The dam itself will be one of the world's highest rock-fill dams rising 395 ft from its foundations. The electric energy generated here, initially 360,400 kilowatts, will help to feed the power-hungry Northwest.

411 TOWERS . . . The power line crosses 100 miles of rugged terrain between the hydro development and Boise. It required 411 galvanized double-circuit steel towers fabricated at our San Francisco tower shop. They vary in height from 102 to 150 ft. Average span length is 1300 ft, although the longest is almost triple that figure, 3725 ft. Construction of about 60 pct of the line is a joint venture of Morrison-Knudsen, Inc., and Kehne Electric Co., of Spokane; the remainder is being handled by the utility's own tower crews.

230-KV . . . The towers will carry two 230-kv circuits. Conductors are 954,000 CM ACSR "Cardinal" with a single ⅜-in.-diam EHS galvanized strand shield wire. Fifteen 5¾-in. x 10-in., 15,000 lb M. and E. ball and socket strain insulators will be used in suspension, and double strings of 17 insulators in tension.

FABRICATED ON COAST . . . The towers were designed, fabricated and galvanized by Bethlehem Pacific. Our West Coast tower shops are located at San Francisco and Seattle. Tower requirements east of the Rockies are handled by our tower shop at Leetsdale, Pa., near Pittsburgh.

These three large shops are fully equipped to detail, fabricate and galvanize your requirements for transmission towers and switching structures. May we quote your next project? Please write or call the Bethlehem sales office nearest you.



This 122-ft, 9-ton tower is being erected by a crane equipped with a 120-ft boom and 20-ft jib. The site overlooks the Snake River near Hell's Canyon.

Cutting overland from Brownlee to Boise, the line crosses terrain ranging from 2208 to 4380 ft above sea level. The distance measures 100.1 miles. Average span length is 1300 ft.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

PRACTICAL AND PERMANENT

PREMAX METAL MARKERS

Attached in seconds, Premax Metal Markers insure permanent, legible identification. They'll never rust, never fade and never need replacing. Standard letters and figures or special characters, in stamped and embossed aluminum or brass. Ask your jobber or write Premax direct.

Premax Metal Markers are R.E.A. Approved.

PREMAX PRODUCTS
Div. Chisholm-Ryder Co., Inc.
5753 Highland Ave., Niagara Falls, N. Y.

THIEL
TRANSFORMER HANGERS
THIEL EASY-DRIVE
FASTENERS
FOR ELECTRICIANS...
REFRIGERATOR MEN PLUMBERS
HANGER KICKERS
THIEL HANGERS are made according to NEMA Specifications—HEAVY STEEL construction, HOT-DIP galvanized for dependable service and long life. Two styles complete with galvanized bolts and nuts.
IN STOCK FOR IMMEDIATE DELIVERY
T-TYPE HANGERS
STAPLES
NEW "GRIP-TYPE"
STRAPS
ANOTHER FIRST FOR THIEL
NEW HUMP
PAT. PENDING
NAIL-IT STRAPS
• Essential for Electrical Men
• Greatest Improvement in 30 Years
SOLD ONLY THRU LEADING ELECTRICAL WHOLESALERS
THIEL TOOL & ENGINEERING CO., INC.
1417 N. MARKET ST. LOUIS 6, MO.

Advertising in This Issue

Allis-Chalmers Mfg. Co. ..4th Cover, 8, 9
Aluminum Co. of America...100, 101
American Chain & Cable Co., Inc., Page Steel & Wire Div..... 94
American Creosoting Corp. 41
Anaconda Wire & Cable Co. ..24, 25
Anchor Metals, Inc. 33
Anderson Electric Corp. 78, 79

Bethlehem Steel Co. 129
Biddle Co., James G. 98
Brewer-Titchener Corp. 102
Buffalo Forge Co. 82, 83

Central Transformer Corp. 44
Chase Brass & Copper Co. 108
Chase-Shawmut Co. 93
Coates Field Service, Inc. 130
Cochrane Corporation 6
Copperweld Steel Co. 35
Crescent Tool Co. 34

Delta-Star Electric Division, H. K. Porter Company, Inc. .. 125
Directory of Engineers..... 128

Electric Machinery Mfg. Co..97, 99
Engineers, Directory of..... 128
Enjay Company, Inc. 107

Fargo Mfg. Co. 75
Ferranti Ltd. 28
Fluor Corp., Ltd. 103

General Cable Corp. 73
General Electric Co.
Apparatus Dept. ...2nd Cover, 67, 68, 70, 71
Wire & Cable Dept. 104, 105
Graybar Electric Co., Inc. 7

Holophane Co., Inc..... 119

Ingersoll-Rand 45

Johns-Manville 114

Keasbey & Mattison Co. 38
Kuhlman Electric Co. 126, 127

Lapp Insulator Co., Inc. 32
Line Material Industries..15, 16, 17, 18, 19

Moloney Electric Co. 46

Ohio Brass Co. 20, 76, 77
Okonite Co., The..... 4

Page Steel & Wire Div., American Chain & Cable Co., Inc. 94
Paranite Wire & Cable Div. Essex Wire Corp. 40
Pennsylvania Transformer Div. McGraw-Edison Co. 31, 95
Pioneer Service & Engineering Co. 96
Preformed Line Products Co. ... 21
Premax Products Div., Chisholm-Ryder Co., Inc. 130

RT&E Corp. 26
Radio Corp. of America..... 27
Reynolds Metals Co. 116, 117
Riley Stoker Corp. 22, 23
Rockbestos Products Corp. 30
Rome Cable Corp. 123

S&C Electric Co. 10
Sangamo Electric Co. 37
Searchlight Section 128
Shaw-Perkins Mfg. Co. 106
Simplex Wire & Cable Co..3rd Cover
Southern States Equipment Corp. 29
Stone & Webster Engineering Corp. 113

Thiel Tool & Engineering Co., Inc. 130
Thomas Works, Delta-Star Electric Division, H. K. Porter Company, Inc.. 81

Wagner Electric Corp. 36
Ward La France Truck Corp. ... 106
Weaver Company, J. A. 42
Westinghouse Electric Corp. ... 85, 86, 87, 88, 89, 90, 91, 92, 120, 121
Wheeler Reflector Co. 43

York-Hoover Corp. 39

PROFESSIONAL SERVICES 130

CLASSIFIED ADVERTISING

F. J. Eberle, Business Mgr.

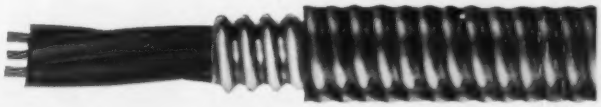
EMPLOYMENT OPPORTUNITIES 130
EQUIPMENT (Used or Surplus New) For Sale 130

The Odds Are 4 to 1

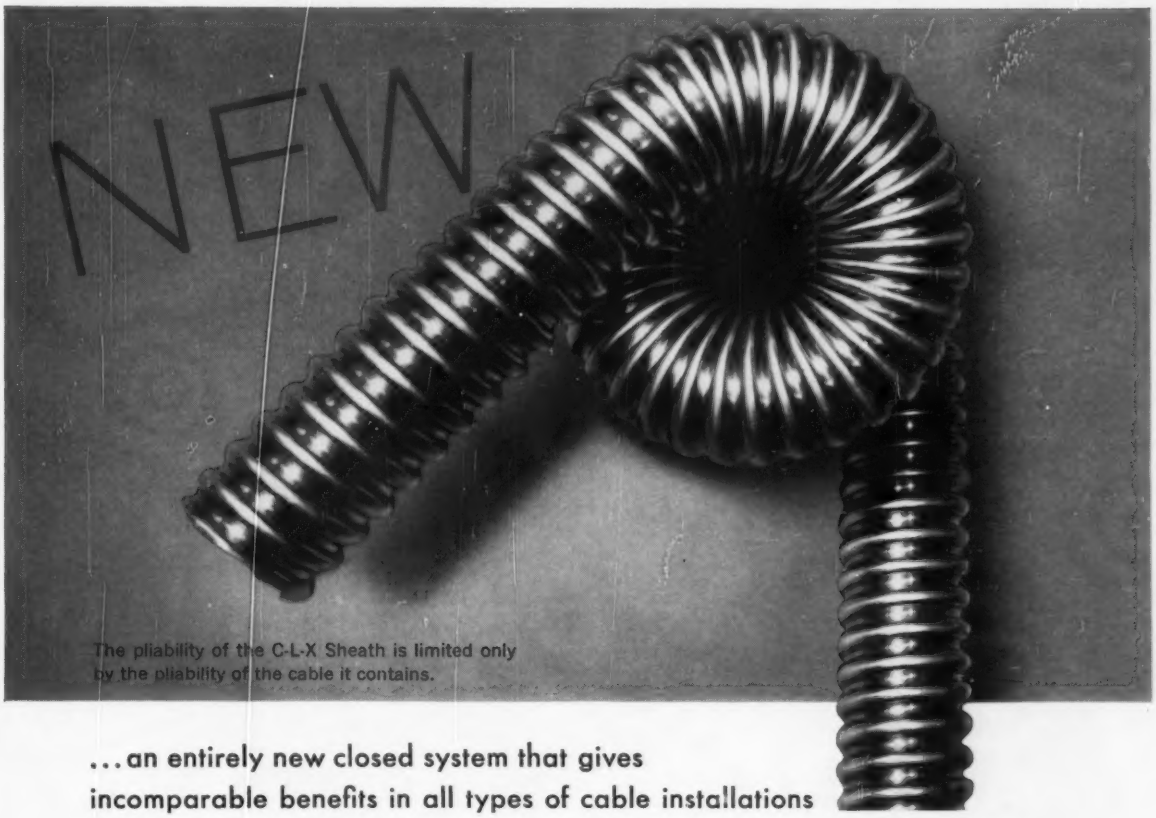
When busy engineers and executives in the dynamic electric power industry get around to naming the one magazine they find most useful in their work, it's ELECTRICAL WORLD, by a margin of 4 to 1. Year after year, survey after survey, WORLD earns *at least* four times as many votes as any other magazine in the field.

COATES *Field Service,* INC.
P. O. Box 1581 Okla. City
Thoroughly Specialized
RIGHT-OF-WAY ACQUISITION
From Title Search . . . To Damage Claims

Simplex



ANNOUNCES the C-L-X* Sheath



...an entirely new closed system that gives incomparable benefits in all types of cable installations

Simplex C-L-X is a Continuous Lightweight eXterior metallic sheath that is impervious to gases, chemicals and water. Its unique construction gives it a combination of properties that is unmatched by any cable system now manufactured in the United States.

C-L-X provides a completely sealed conduit — with "built-in" cable. C-L-X combines all the advantages of lead sheathed and interlocked armored cables. In addition, it has its own intrinsic qualities of great strength with extremely light weight. It is suitable for installation in trays or by clamps. C-L-X can be used aerially or buried directly in the ground. Its pliability permits ease of installation.

For more than a decade, this type of cable protection has given exceptional service in European installations. *Now, Simplex engineering has adapted C-L-X so that its scope of industrial applications is practically unlimited for modern American installations.* It is unequalled in situations where impermeability and durability are important.

Like all Simplex products, C-L-X is engineered for lasting quality and, therefore, *dependability*. Write for specific product data.

*(Continuous Lightweight eXterior, pronounced "Sealex")

LIVE BETTER ELECTRICALLY

Simplex WIRE & CABLE COMPANY

79 SIDNEY STREET, CAMBRIDGE 39, MASS.

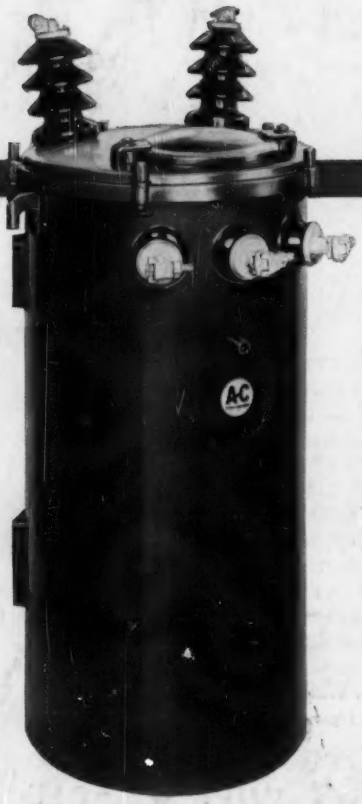
"the American manufacturers of transoceanic telephone cables"

Craftsmanship at Allis-Chalmers

..includes

Careful Crating

of Distribution Transformers



Advanced engineering and manual skill at Allis-Chalmers extend even to the crating operation. Exhaustive shock tests of crate designs combined with care in manufacture assure safe arrival of shipments . . . protect the outstanding performance and long life built into every Allis-Chalmers distribution transformer. You save time and money in handling costs, as sturdy construction of crates keeps damage to a minimum. Each crate bears the seal of approval by the National Safe Transit Committee.

Pallet base facilitates safe, easy handling

The pallet base of the Allis-Chalmers transformer crate affords the speed, convenience and safety of fork truck stacking . . . promotes maximum utilization of valuable space. Because of its sturdy construction, the crate base may be reused for your own materials handling and storage.

For the complete craftsmanship story, see your Allis-Chalmers representative or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5487